



## The Role of Objects in the Constitution of Collaborative Spaces

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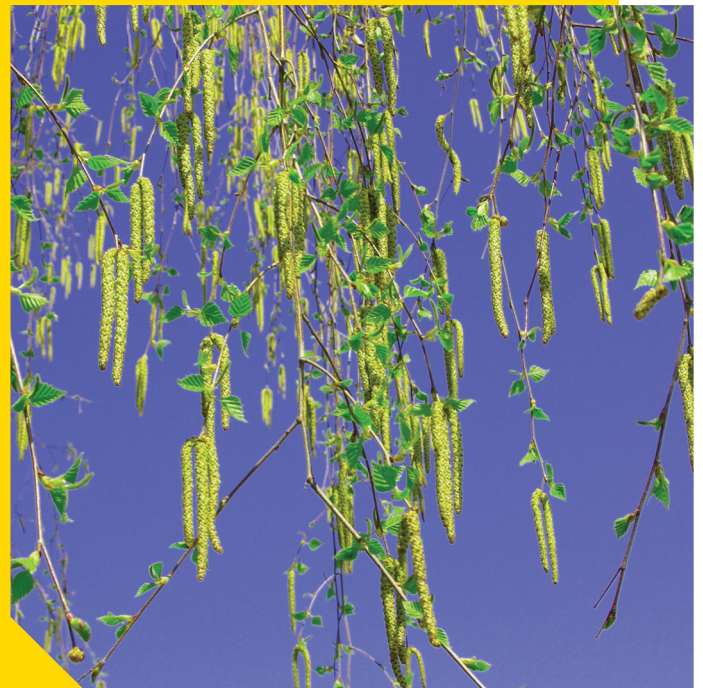
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Department of Industrial Engineering and Management

# CO-CREATE 2013

The Boundary-Crossing Conference on Co-Design in Innovation

Edited by Riitta Smeds & Olivier Irrmann





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The Boundary-Crossing Conference on Co-Design in  
Innovation

**Edited by Riitta Smeds & Olivier Irrmann**

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# Preface

CO-CREATE 2013 – The Boundary-Crossing Conference on Co-Design in Innovation

Global competition drives companies and public organizations towards increasing efficiency in networks, often enabled by ICT. However, in this race, the capabilities of knowledge creation and innovation in the networks become critical. The emerging new approach towards innovation is the broad engagement of actors in the whole innovation process. Ideally, all actors in the emerging value network should engage in co-design for innovation: the end-user, the customer, the employee, the “other department”, the partner, the provider, the competitor, the citizen. Innovation needs to take a human centric perspective.

The CO-CRAETE 2013 conference is organized at Aalto University. Aalto University was founded in 2010 as a merger of three established universities on the idea that integrating technology, business and design expertise would burst innovation in the new economy. Aalto University thus provides new opportunities for strong multi-disciplinary research with ambitious goals. This vision has triggered leading-edge collaboration between design, knowledge co-creation and innovation researchers within and across the borders of the university, and attracted internationally renowned researchers. Their joint research interests have been crystallized into co-created projects and seminars.

The CO-CREATE 2013 conference is the first venue of a series of compelling multidisciplinary discussions on the shared theme of co-creation. To be able to study co-creation, we have to collaborate in research across disciplinary borders! The conference is convened by SimLab, a research and teaching unit at the Department of Industrial Engineering and Management, Aalto University School of Science. The CO-CREATE 2013 conference also celebrates the results of SimLab’s FiDiPro project Corinna, “Collaborative innovation in ICT-enabled business processes and business models”, with Sirkka Jarvenpaa as its FiDiPro professor.

The call for papers for the CO-CREATE 2013 conference invited researchers of collaborative innovation, co-design and knowledge co-creation to a trans-disciplinary dialogue on the human-centric co-design of innovation in networks. We wanted to engage researchers in the fields of organization theory, management science, service research, law, design research, and learning sciences, as well as in computer science and engineering, to

collaborate in the conference. Contributions in the following four conference themes were called for:

1) *Theoretical foundations of Collaborative Innovation Processes*: What are the commonalities and the differences between the collaborative phenomena labeled as co-design, knowledge co-creation, and collaborative learning? How to conceptualize the engagement and the management of users, customers, partners for the co-development of innovation? What are the theories of collaboration, and after all, what indeed is a collaborative process?

2) *The Management and Organization of “CO”*: Does collaborative learning and knowledge co-creation require new work practices, structures or technologies, and how to generate new collaborative routines? Are co-design processes only emergent or can they be designed and managed? What are the collaboration practices of actors in innovating networks, and can these practices be transferred or adapted to new contexts? What are the limits of participation, sharing, and openness? How can co-design be managed so that the innovation brings added value to all its participants?

3) *Paradoxes in collaborative and open innovation in networks*: Tensions in collaborative innovations can originate from perceived differences between the collaborators but also from conflicts in business interests and value creation. For example, how to manage tensions in collaborative innovation between private and public organizations, or between organizations with different desired levels of openness? How to manage the paradoxes of innovation versus efficiency, openness versus closedness, distance versus proximity, public versus private, service versus product, technology versus people, virtual versus face-to-face, or radical versus incremental?

4) *Spaces, Methods and Tools for Co-Design and Co-Creation*: What are the rationales behind co-design and co-creation practices? What is the role of “face-to-face” interaction in co-creation? Can innovative interaction also be achieved in virtual environments, and under what conditions? Are innovative collaborative spaces, communities and processes mainly emergent, or can they be designed, too? How are boundary objects, practices and spaces intertwined with collaboration and co-creation? How can emotion be mediated in virtual interaction? And what is the role of facilitation?

The scientific community responded to our call with altogether 84 extended abstracts. After a double blind review, and the full paper writing process, we accepted altogether 64 papers, out of which 59 are printed in this

Proceedings, grouped into the four themes, among which the themes 2 and 4 were the most popular. The papers are written by altogether 128 authors.

The papers are printed in these proceedings under themes in alphabetical order, according to the name of the first author. At the end of the book, an index of all authors is given.

## THE CO-CREATIVE CONFERENCE

We have co-designed the three day conference itself to follow a process of participative knowledge sharing and co-creation. No power-point slides are presented, except for the four keynote presentations. Instead, the participants discuss their research in thematic round tables of 8-10 participants each, located in the same conference hall. Before the discussions, the participants bring to their tables short visualized introductions of their research.

During the first, Theoretical Sharing Day, they present and discuss their key theoretical concepts and constructs. The second, Empirical Bridging Day, starts with a plenary: an Industry Workshop where representatives of three case organizations present real-life examples of co-creation in dialogue with researchers. In the round tables, the participants then continue with the discussion of the industrial cases and of their own empirical research, and share their insights in plenary. During the third, Co-Creating Day, the round-tables create collaboratively research agendas for the future, and share them in the final plenary discussion.

With this conference design, we hope that Co-CREATE 2013 will create the researchers' enthusiasm to continue the research, initiate novel multidisciplinary research groups, and start the evolution towards a research community in the field.

## ACKNOWLEDGEMENTS

The International Program Committee has done a great job in reviewing the extended abstracts for the conference! Thank you!

The CO-CREATE 2013 Local Organizing Committee has made the conference come true! It has enthusiastically and reliably co-developed the conference program. Olivier Irrmann as conference vice-chair, and Sara Viitala as conference project manager and secretary of the Local Organizing Committee, have with high commitment and skill managed the digital abstract and paper process, and communicated with the huge network of authors, reviewers, and other collaborators and partners, continually

updating the website, and finally co-editing these proceedings. Throughout the conference preparation process, all Local Organizing Committee members have reliably and efficiently taken care of all issues at hand. Thank you all, for your great work and commitment!

I express my warmest gratitude to the Finnish Funding Agency for Technology and Innovation Tekes, the main financier of the CO-CREATE 2013 conference, via SimLab's FiDiPro project Corinna. I also thank Aalto University School of Science, Department of Industrial Engineering and Management, for its support. The City of Espoo has shown us great hospitality, for which CO-CREATE 2013 is most grateful.

Finally, my deepest thanks go to the participants of the conference: the keynote speakers, industry workshop presenters, authors, round table participants, discussants, facilitators, and technical assistants - all co-creators of our CO-CREATE 2013 conference!

CO-CREATE 2013 is the inaugural conference in the novel and highly interesting multidisciplinary theme of co-design in innovation. May this conference start active multidisciplinary research and a series of successful CO-CREATE conferences in the future!

Espoo, Finland, May 31, 2013

Riitta Smeds

Chair of the conference

Professor, Business and Service Processes in Digital Networks

Director, SimLab

Department of Industrial Engineering and Management

School of Science

# Theme 1

Theoretical foundations of Collaborative Innovation





# Typologies of localized spaces of collaboration

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## ABSTRACT

*Hacker spaces, maker spaces, Living Labs, Fab Labs or co-working spaces are common denominations of localized spaces of collaboration (LSC) where knowledge communities meet to collectively innovate. These spaces can represent a key element in the innovation ecosystem of cities, bridging between individual's creativity and the firms' innovation. However, the increasing importance of this phenomenon has been overlooked by researchers on innovation both in organizations and in territories. The research here presented is a first attempt to study the LSC phenomenon globally, by proposing a typology that classifies 120 spaces depending on the leaders (users or organizations) and the main driver (social or economic) of the projects developed in the LSC. The contribution of this paper is to propose a practical methodology that could be applicable to the classification of other existing LSC. Furthermore, the proposed typology could be used by policy makers to reinforce the interactions between the actors of the local innovation ecology.*

## KEYWORDS

*Collaborative innovation, Hacker spaces, Living Labs, Fab Labs, co-working spaces, open business*

## INTRODUCTION

The creativity necessary to develop innovative products is often found outside firms, in the same local innovative environment. But selecting and hiring single talented individuals might not be sufficient to integrate the innovation developed externally due to the fact that innovation is generally the result of co-creation within communities outside firms and not the result of single individuals.

A territory's innovation capacity highly depends on its capacity of enabling knowledge flows between the different stakeholders. Beyond the classical view that considers innovation as a process run in the R&D departments, organizations both private and public currently put in place ways of tapping the creative and innovative capacity of a vast number of individuals that are outside their formal boundaries.

These practices have generally taken a top-down approach. Open innovation (Chesbrough 2003) for instance has focused in initiatives from firms to align collective efforts towards the development of commercialized products and services. Public institutions have also progressively allowed a higher citizens' participation by providing more information and receiving feedback through the use of new technologies of information and communication.

However, as the creative class theory advocates (Florida 2012), soft aspects like, for instance, to nurture a lively artistic and cultural local atmosphere is also important to attract talented and creative workers that will contribute to the local innovation system.

In the last decades, hacker spaces, maker spaces, Living Labs, Fab Labs or co-working spaces and other localized spaces of collaboration (LSC from now on) have spread worldwide. These spaces, despite having common aspects, take different configurations.

In this paper, the different LSC are analyzed to determine a typology wide enough to include the biggest amount of LSC but considering enough detailed criteria to allow a meaningful classification.

A LSC is defined as a space open to the public in order to foster collective creativity. For our research, we have considered the following common characteristics shared by all LSC:

- 1) they are spaces open to the general public.
- 2) they have a defined focus and goal collectively agreed by their members.
- 3) they share information, and tools among the members and they encourage the free sharing of knowledge

The above definition is related to the three common characteristics that define a community of practice (Wenger 1999).

The increasing phenomenon of LSC has been related to commons-based peer-production (Benkler & Nissenbaum 2006) and the emergent 'fabbing' movement (Troxler 2010). However, we have avoided including the terms "fabrication" or "production" that have connotations of tangibility and materiality to also consider collaborative spaces that might focus on the

development of immaterial outcomes, like services, new knowledge or networking.

Around the world, several thousands of spaces with a diversity of names fulfill the above definition like labs (Fab Labs, medialabs, Living Labs, maker labs), hubs, thinktanks, clubs, maker spaces etc. However, a considerable number are labeled by their members under the following four denominations: Fab Labs, Living Labs, co-working spaces, and hacker spaces.

## THEORETICAL BACKGROUND

Research on innovation in economic geography has dealt with the study of knowledge flows between actors in geographical proximity, underlining the importance of the transfer of knowledge and most importantly, tacit knowledge (Gertler 2003; Maskell & Malmberg 1999; Howells 2002; Howells 2012).

The distinction between two kinds of knowledge, tacit and explicit, is important in the study of localized learning (Polanyi, 1966). Explicit knowledge is the knowledge that can be codified and consequently easily transmitted. Tacit knowledge, on the contrary, can be difficult expressed and codified due to that “we can know more that we can tell” (Polanyi 1966, p.4). These two kinds of knowledge are intimately related in the process of knowledge creation and cannot be separated (Nonaka & Takeuchi 1995). The transmission of tacit knowledge requires a close and frequent interaction between individuals. This is the reason why face-to-face contact and co-location are important aspects for the transmission of tacit knowledge. But co-location by itself cannot ensure knowledge transfer and learning (Boschma 2005). Cognitive proximity is necessary to obtain the sufficient absorptive capacity to be able to detect and take advantage of the new knowledge (Nooteboom et al. 2007).

However, geographical and cognitive proximity are not independent. One of the main arguments in the “learning regions” thesis (see for instance Florida 1995; Morgan 1997; Maskell & Malmberg 1999) is that tacit knowledge cannot be transferred easily because it needs a face-to-face interaction between individuals that share the same institutional context about communication codes, values and conventions. Furthermore, the transfer of tacit knowledge cannot be dissociate from the creation of new knowledge as the two phenomena occur simultaneously through the mechanism of user-producer interaction (Lundvall 1988; Gertler 1995). The new knowledge is consequently deeply embedded in the geographical

context and is dependent of all the implied stakeholders. The potential innovations that would derive from this knowledge would be then the result of a co-creation that could be fruit of informal interaction and not deliberate.

Research on knowledge communities in general and communities of practice specifically highlight the crucial role that they play in the knowledge flow (Brown & Duguid 2000; Wenger 1999; Wenger & Snyder 2000). According to this literature, cognitive and social proximities play a major role than geographic proximity, allowing tacit knowledge to flow beyond the localized context of the knowledge creation among the community members (Amin & P Cohendet 2004). Even if this might be true in theoretical terms, in practice, the intensity of interaction among members of a community of practice force them to concentrate their knowledge exchange with a limited number of persons, mainly the ones whom they share a closest proximity and relationship (Brown & Duguid 2000, p.143).

These studies have however mainly underlined the importance of knowledge communities in an organizational context (Wenger 2000; Wenger & Snyder 2000; Amin & P Cohendet 2004). The role that play communities outside organizations in the innovation process has been seldom investigated. However, a multitude of LSC has emerged in the last decades creating a phenomenon that has been referred as “fabbing” (Troxler 2010). In the next section, different knowledge communities represented by diverse types of LSC are presented. The differences between them are analyzed in order to define a typology of LSC.

## METHODOLOGY AND DATA

This research includes data from LSC that use the following four denominations: Fab Labs, Living Labs, co-working spaces, and hacker spaces. The theoretical and practical reasons are the following: Firstly, taking groups of LSC offers a first rough filter of spaces as each group includes several hundred spaces. The available definitions of these groups also allow confirming as a first approach the applicability of the above LSC definition. Secondly, the groups are independent. Apart from few exceptions, there are no LSC that consider themselves as belonging simultaneously to two denominations. Thirdly, for all four denominations, listings of spaces are published online and are of public access.

This study is based on primary source data, as it analyses texts extracts from the webpages of the different LSC. The extracts were the texts

described by the LSC responsible members or founders to describe their activities and goals. Generally the texts were under the section title “About us”, “Mission”, “Who we are” or similar. Other parts of the website that would deal with these issues were also used in some cases. The text length was two pages in average. In the case of Living Labs, the data used was the form that each space filled in to apply to be officially recognized by the European Network of Living Labs (ENoLL). Table 1 represents the sources where the listings were extracted from. Analyzed spaces were selected randomly from the listings after discarding not active spaces and spaces with no webpage.

LSC denomination	Data source	Total number of active spaces worldwide	Number of spaces analyzed
Fab Labs	<a href="http://wiki.fablab.is/wiki/Portal:Labs">http://wiki.fablab.is/wiki/Portal:Labs</a>	About 220	30
Co-working spaces	<a href="http://wiki.coworking.com/wiki/page/29303049/Directory">http://wiki.coworking.com/wiki/page/29303049/Directory</a>	About 2500	30
Hacker spaces	<a href="http://hackerspaces.org/wiki/List_of_Hacker_Spaces">http://hackerspaces.org/wiki/List_of_Hacker_Spaces</a>	Around 800	30
Living Labs	<a href="http://www.openlivinglabs.eu/livinglabs">http://www.openlivinglabs.eu/livinglabs</a>	319	30
TOTAL		About 4000	120

**Table 1: Data sources**

## EVALUATION OF DATA

The research was based on an exploratory study as it deals with an emergent phenomenon (Eisenhardt 1989) and there is a lack of research about LSC. Information about activities in the different LSC is however overwhelming as LSC tend to document all their activities and resources on their websites. The methodological approach for the typology has tried to be as inclusive as possible to take into consideration the biggest possible amount of LSC. To do so, we have opted for a qualitative research based on text analysis of the content of the selected LSC webpages.

The definition of a typology of LSC presented several challenges. The first obstacle was the big amount and diversity of collaborative spaces and the terms to define them risked to cause “death by data asphyxiation” (Pettigrew 1990). This obstacle was avoided firstly by limiting the scope of the research by specifying the common aspects to be considered to include a LSC in the study, following the definition of LSC. For instance, spaces that were not open to the general public were excluded of the analysis. Secondly, by grouping the LSC in a priori classification that responds to the above definition of LSC. We identified four main denominations of LSC that each

clusters several hundred LSC: Fab Labs, Living Labs, co-working spaces and hacker spaces. Thirdly, by starting the analysis focusing on a short list of thirty spaces for each identified main denomination, summing 120 spaces in total. The sample has been extracted randomly from the listings and will be used to define the typology that will later be used as the framework to analyze further LSC.

The second challenge was to identify commonalities and differences between the selected LSC. The first step consisted in a rough text analysis to extract the most cited words considering all texts together using Nvivo software. The results showed that the words “project” and “projects” -taken together- represent the most cited words taking all the texts together (0,93% of the total number of words in the 120-text sample). Once the main similarity between all the LSC was identified (they all deal with projects), our research focused on determining the differences between the LSC projects.

The second step of the analysis consisted in a qualitative analysis of the raw data to identify the two main axis of classification related to differences in projects developed in the LSC. Data from the LSC was systematically coded with Nvivo software according to the following aspects about the LSC projects: types of users, types of shared tools, types of funding, types of interactions and relationships and types of outcomes. Following a quantification strategy (Langley 1999), we identified the aspects that could explain more significantly the differences between different LSC projects.

The first classification depends on the goal of the projects. LSC can be classified considering if projects developed in the LSC have a non-profit goal or not. Non-profit projects include educational projects, projects aiming social integration or hobbyist projects. For-profit projects include projects developed for an entrepreneurial endeavor or for a company or aiming to the territorial economic development.

The second classification axis differentiates between the LSC that develop project that are led by individuals and the ones that are led by institutions. These are projects that are initiated, sponsored or proposed by organizations and institutions.

Following these classification guidelines, the third step of our analysis consisted in determining the keywords that were more recurrent and that could justify the classification issued of the previous step. This was done by the quantification of the most cited words of the quotations used in the second step. The resulting keywords are represented in table 2.

Id.	Aspect	Keywords coded
A	Projects mainly lead by INSTITUTIONS	network, research, city, public, partners, university, students, education, infrastructure, industry, government, country, researchers, businesses, national, institutions, enterprises
B	Projects mainly lead by USERS	community, ideas, involved, together, artists, interested, inventors, personal, idea
C	FOR PROFIT projects or focusing on local ECONOMIC DEVELOPMENT	work, innovation, business, research, services, office, partners, entrepreneurs, products, companies, professional(s), team, management, service, company, industry, private, production, market, businesses, economic, enterprises
D	Projects NON PROFIT projects or focusing on SOCIAL ISSUES	social, environment, rural, free, students, artists, education, society, educational

**Table 2: Coded keywords**

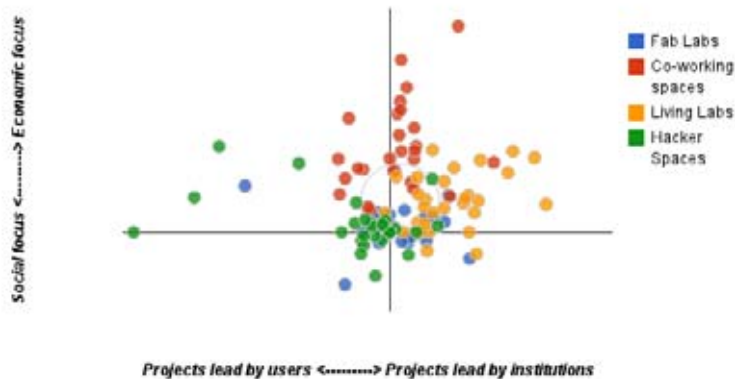
The fourth step consisted in cleaning the results by checking that each keyword corresponded to the considered aspect by analyzing the meaning of the keyword used in the context of the quotation.

The fifth step was to assign a numerical value to each LSC for each of the four aspects corresponding to the number of times that a keyword corresponding to each aspect was cited. Afterwards, each LSC was reduced to a binome (H;V) consisting in:  $H = \text{Aspect A} - \text{Aspect B}$  and  $V = \text{Aspect C} - \text{Aspect D}$ . All the LSC were represented graphically.

## FINDINGS

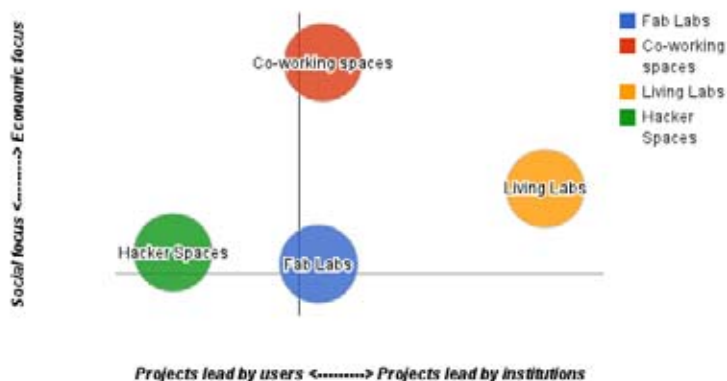
The results of the analysis are represented in Figure 1 (graduation and scale of the axis have been deleted to focus on the relative position of the LSC).





**Figure 1: Representation of 120 LSC according to the leadership and the focus of the projects developed.**

Figure 2 represents the relative position of the four LSC denominations (as an average of the 30 LSC included in each category).



**Figure 2: Relative position of the different denominations according to the leadership and the focus of the projects developed.**

The results show that there are substantial differences between the approaches of the different four denominations. The two groups of LSC that are integrated in a formal network and that have committed to follow specific guidelines, the Living Labs and the Fab Labs, show a smaller dispersion than the denominations with blurrier definitions, the co-working spaces and the hacker spaces.

Co-working spaces show a clear focus on the economic aspect. The fact that services offered by these spaces aim generally for-profit startups or freelance professionals could justify this aspect. As Fab Labs, co-working

spaces present a mix of projects, some of them proposed and funded by institutions, and some by their users.

Considering the project focus, the majority of the hacker spaces that have been analyzed are relatively closed to the average Fab Lab, indicating that, despite not using the same denomination, the goals and the focus are similar. The analysis shows as well that hacker spaces have also an interest in economic development of their local environment. This fact does not imply that their projects are for profit, but that in certain cases they welcome entrepreneurs and are interested in the economic impact of their activities in their local environment. This aim is coherent with hacker ethics that advocate for a positive impact in the social and economic environment.

Living Labs are the LSC that follow the most a top-down approach. They are normally founded and funded by public institutions and are located in public buildings. In opposition, hacker spaces are the LSC that developed the most projects that are initiated by their members. Most hacker spaces websites are a showroom for their members' individual projects.

## **DISCUSSION**

Even though the four LSC groups present differences that justify the use of different denominations, the analysis showed that, excluding extreme cases, the hacker spaces / maker spaces and Fab Labs share similar approaches. They all are mainly concerned about projects led by users and about having an impact on the social environment. Living Labs have also the social concern but the influence of institutional initiative is much stronger. The results of the analysis have not identified LSC that have a clear economic focus and at the same time are led by institutions or formal organizations. We suggest that the innovation approach advocated by open businesses fulfills these conditions. Open businesses are organizations that by applying open business models (Chesbrough 2007), chose to increase transparency and stakeholder inclusion. Their structures are open, and voluntary contributors are rewarded in proportion to their implication, reputation and the economic impact of their work. Such businesses respond to the LSC definition that has been used in this research and at the same time are for-profit organizations. This organizational structure is emergent and few companies apply open business practices (one example would be open network Sensorica.ca operating mainly in Montreal). In table 3 the summary of the typology of LSC is represented.

	Focus on individuals goals	Focus on organizational goals
Economic main driver	Co-working space	Open business
Social main driver	Hacker space, maker space, Fab Lab	Living Lab

**Table 3: Typology of LSC**

## IMPLICATIONS FOR POLICY MAKERS

Urban and regional innovation policies have aimed the firm level (for instance, by reducing taxes) or the individual level (for instance, by applying policies to attract talent, following Floridian theories). Few policies have however fostered the identification, and nurturing of an intermediary level between firms and individuals: the communities (Cohendet et al. 2010). This study contributes in this direction by identifying actors of the middleground and by studying their relative distance to the upper- and middleground.

## CONCLUSIONS

The contribution of this paper is to present a first attempt to define a typology of the emergent phenomenon of LSC. Even though the number of LSC created around the world is increasing substantially every year, there is little research that studies the phenomenon globally or that studies separately any of the LSC denominations presented in this paper. The methodology applied in this research present also several advantages. Firstly, it uses publicly available data, from primary sources. Secondly, using keyword quantification simplifies the characterization of LSC. Thirdly, as a consequence of the previous points, this methodology could be applied to consider the 4000 LSC (see table 1) that the four studied denominations include.

This analysis presents though a number of limitations. First, it considers keywords as a proxy for characteristics. However, this might lead to an oversimplification of the data and a loss of the richness of the data. The methodology also forces a translation of the source data in order to apply the keyword analysis, with the consequential risk of loss of context.

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# Success factors of innovation ecosystems - Initial insights from a literature review

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## ABSTRACT

*The aim of this paper is to review research on innovation ecosystems to derive success factors supporting the implementation of them. The reviewed studies highlight different factors for the successful implementation of innovation ecosystems which can be assigned to the areas of resources, governance, strategy and leadership, organizational culture, human resources management, people, partners, technology and clustering. Based on the findings a number of future research directions are proposed which may stimulate more research in this new field of study.*

## KEYWORDS

*Innovation ecosystems, Innovation, Success factors, Literature review*

## INTRODUCTION

Scholars as well as practitioners increasingly identify the usefulness of the concept of innovation ecosystems for explaining cooperative innovative activities. Yawson (2009) argues that one of the reasons behind the emergence of ecosystem analogy is the inability of traditional innovation models to identify successful policy strategies that drive innovations at national levels. It is believed that the evidence-based platform for science and innovation policy needs to be extended beyond input-output correlations, such as R&D investments and patent counts (Yawson 2009). Ecosystem thinking combines various perspectives from open innovation, crowdsourcing, strategic management, economics, structural theories etc. to the biological and evolutionary analogies and metaphors. The fundamental hope behind ecosystems thinking is to expand the capabilities of one actor beyond its own boundaries and transfer knowledge into innovation in collaboration with others (e.g. Adner 2006).

To make innovation happen a suitable innovation ecosystem must meet different conditions. These conditions may address natural, structural, organizational and cultural factors. Taking this path, the aim of this paper is to review empirical research on innovation ecosystems to identify factors that support a successful implementation of it. Accordingly, our research question is the following: What are the success factors of innovation ecosystems as derived from the empirical research literature? Innovation ecosystem is a fairly new concept; consequently it is likely to assume that a research field on its own has been not developed yet. Therefore, our motivation is also to contribute to the academic discussion. Concurrently, we hope our review would pinpoint relevant areas for future research helping to further develop the concept of innovation ecosystem.

The paper is organised as follows: In the next section the literature and concepts related to the research aim are briefly discussed. Then the research method employed to answer the research problem is described. Thereafter, the results are presented, and in the final section, the conclusion and implications of the study are laid out.

## THEORETICAL BACKGROUND

### **Innovations and ecosystems**

In academic literature, innovations are often defined as new ideas, improvements or solutions that are implemented and transferred into useful outcomes (e.g. Bessant & Tidd 2011); thereby acknowledging that not all creative ideas become innovations, but only if they are implemented and adopted in a beneficial way. Innovations are generally discussed positively (Jalonon 2012) and are seen as beneficial both for companies and for nations in order to survive and develop in a market environment, “create value”, and enhance competitiveness.

“Ecosystem” is a term combining the words “eco” and “system”. The former has its origin in ecology and refers to the relation of living things to their environment. The latter originates from Greek and stands for an organized whole or body. Ecosystem as a scientific concept derives from the study of natural ecological systems. In a biological sense, an “ecosystem is a set of organisms interacting with one another and with their environment of non-living matter and energy within a defined area or volume” (Miller & Spoolman 2009, p. 7).

## Thinking innovations through ecosystems

Applying ecological concepts to management and organizational literature have long traditions (e.g. Penrose 1952). From an ecological point of view, human organizations have been studied either as populations of one branch or as communities of populations competing and/or cooperating to obtain resources from community environments (Monge et al. 2011). The ecological perspective emphasizes environmental resource niches and adaptation as fundamental driving forces of the community and dynamic evolutionary processes, such as variation, selection, and retention (Monge et al. 2008). The study of “innovation ecosystems” can be seen as a continuation of the line of research using ecological analogies and perspective.

Innovation ecosystems have been described in multiple ways. According to Adner (2006), innovation ecosystems can be defined as “the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution” (p. 98). Mercan & Göktaş (2011) specify that an “innovation ecosystem consists of economic agents and economic relations as well as the non-economic parts such as technology, institutions, sociological interactions and the culture” (p. 102), suggesting that an innovation ecosystem is a hybrid of different networks or systems. The collaborative arrangements, as highlighted above, might be based on local concentration of industrial specifications, such as Porter's (1998) clusters, but the ecosystem model has expanded the idea of local clustering, to encompass global, networked economy and various interdependent actors (Rubens et al. 2011). Additionally, the idea of open innovation expands the scope of potential participants of the innovation process from internal actors of the R&D function to the numerous possible co-creators and co-innovators outside an organization. In this sense, ecosystem thinking comes close to what is called an open innovation. In open innovation, actors purposively tap into the inflows and outflows of knowledge by opening up the innovation process, thus accelerating internal innovations and expanding markets for external use of it (Chesbrough 2003).

Using the ecosystem analogy, innovation ecosystems are not a matter of single actors, but of interacting populations of actors residing in a certain environment. Rubens et al. (2011) refer to this idea as “creation nets” that provide a mechanisms for “(a) goal-focused creation of new goods and services tailored to rapidly evolving market needs, (b) with multiple institutions and dispersed individuals, (c) for parallel innovation” (p. 1743). These creation nets come close to what Wang (2009) refers to as



“innovation communities”. Innovations communities are “a set of organizations and people with interests in producing and/or using a specific innovation” (Wang 2009, p. 8). According to Wang, such communities emerge and evolve around innovation orchestrating activities and dissolve once the collective attention disappears. The innovation ecosystem is thus, what constitutes a complex set of innovations and communities, their producers and developers and interactions between them (Wang, 2009). Behind the rationale for coming together to innovate is, according to Adner (2006), the fact that innovations rarely succeed in isolation but are dependent on many types of complementary innovations. Therefore, an ecosystem allows firms to create value that no single firm could make alone. Ecosystem approach extends the cooperation beyond bargaining over the value capture of each actor and includes considerations of challenges that different actors need to overcome to make sure that the value is created in the first place (Adner & Kapoor 2010). Ecosystems thinking can also be seen as a means to combine the idea of collaborative “business ecosystems”, as coined by Moore (1993).

Ecosystem thinking has also been applied at national level (Carayannis & Campbell 2012; Jackson 2011; Metcalfe & Ramlogan 2008; Yawson 2009). Theories on innovation systems, such as national (Lundvall 1992), and regional (Cooke et al. 1997) system of innovations have emphasized the idea of innovations as an open and interactive, i.e. “systemic”, processes by their very nature. However, for example, Yawson (2009) sees as one of the reasons behind the introduction of the ecosystem framework traditional innovations models’ inability to identify the successful policy strategies that drive innovations at national level. In a similar way, Metcalfe and Ramlogan (2008) redefine the traditional innovation systems models by their ecological analogy. In innovation ecologies “the principal actors are usually for-profit firms, universities and other public and private specialist research organisations and knowledge-based consultancies” (Metcalfe & Ramlogan 2008, p. 441). According to Papaioannou et al. (2007), the main difference between traditional innovation system thinking and ecosystem thinking is the stronger incorporation of market mechanism with the latter, whereas the traditional approach highlights the role of non-market institutions and historically formed relationships.

As indicated above, ecosystems are discussed under different labels such as platform leadership, keystone strategies, open innovation, value networks, and hyperlinked organizations (Adner 2006); consequently a unified and clear distinction has not emerged yet.

### **Critical thinking about the concept of innovation ecosystem**

Papaioannou et al. (2007) ask whether the ecosystem analogy can be used to describe socially dynamic environments of innovations and whether the biological metaphor is plausible and consistent with the Schumpeterian tradition of thought, according to which innovation is essentially understood as a discontinuous and uneven historical process evolving under the influence of complex economic, social and political factors. Indeed, Papaioannou et al. (2007) argue that “eco-thinking ... does not adequately capture the distinction between innovation events and structures, going beyond them to integrate innovation activity in companies and organisations” (p. 5). In addition, Papaioannou et al. (2007) claim, referring to Powell et al. (1996), that despite the abstract similarities between biological and innovation ecologies, “the latter includes complex social interrelations and networks ... which are historically developed” (Papaioannou et al. 2007, p. 5). Therefore, division of labour and environment of knowledge and innovations are not biological and adaptive but social and historical processes with contradictory and uneven relations of power.

Wallner & Menrad (2011) claim that the perspective adopted by Adner and Kapoor (2010) is rather linear and deterministic. According to Wallner & Menrad (2011), the linear view is focused on input factors that are supposed to influence innovation capacity, although “ecosystem is not a trivial machine, with defined input-output ratio” (p. 2). Judy Estrin (2009) provides an alternative view on innovation ecosystem at the national level. She suggests that “innovation ecosystems are made up of communities of people with different types of expertise and skill sets” and that the most important communities are research, development, and application (p. 37–38). According to Estrin, in order for ecosystems to be innovative, there must be a constant and balanced cross-pollination of ideas, questions, knowledge and technology between the most important communities. Each community must receive “nutrients” through different supportive structures, such as leadership, funding, policy, education, and culture. As Wallner & Menrad (2011) also note, cross-pollination is apparently, at least partly, a cultural aspect calling for communication, and willingness and trust to share and receive information.

Some of the remaining challenges concerning ecosystem thinking are associated with its plausibility as an analogy, that is, whether the biological analogy stands as a reasonable fundament for explaining human activity and the social context. How to enable, for example, cultural values to encourage knowledge sharing or other innovation fostering behaviour?

When using analogies, one must be aware that ultimately it is a matter of innovation theories and empirical research and – in general – theories of human behaviour, whether or not biological heuristics are plausible (cf. Cohen 1994; Stewart 2001).

## METHODOLOGY OF LITERATURE REVIEW

In the review process, the authors adopted the principles of a systematic review as recommended by Jesson et al. (2011). First, a research plan was developed comprising the research questions of interest, the keywords, and a set of inclusion and exclusion criteria. The paper's aim was to determine the current status of research on innovation ecosystems to identify success factors facilitating the process. To help answer the research question inclusion and exclusion criteria were specified. The inclusion criteria were: peer reviewed journals, English language. Grey literature such as reports and non-academic research, other languages than English represented exclusion criteria. Additionally, an excel data sheet was produced consisting of key aspects related to the research aim. In the given case these were: name of author(s), year of publication, research aim / objectives, theoretical perspective / framework, method, main findings, and name of the journal. Once all the relevant issues had been specified, the databases Web of Science, Proquest ABI/ INFORM and EBSCO were accessed and searched for materials, using the keyword set. As keyword "innovation ecosystem" was used. The databases were searched for articles that had explicitly "innovation ecosystem" in the abstract or title. This proceeding led to 7 hits with Web of Science, 6 hits with ABI/INFORM and 4 hits with EBSCO. The search took place in November 2012 and again in March 2013. Next, one of the authors scanned the articles' titles, abstracts and, if relevant, more parts, beginning with the conclusion section, to make sure that they actually fell within the scope of interest. Nine papers fulfilled the criteria set and thus formed the basis of analysis. In the next stage, the authors discussed the findings, which helped them to clarify what is known about success factors related to innovation ecosystems. The final stage of the review process comprised the writing up of findings.

## PRESENTATION OF FINDINGS

### **Studies involved**

The nine papers that formed the basis for our analysis are summarised in Table 1. The oldest publications are from 2006 and the most recent one is from 2012.

Author(s)	Year	Research aim/objectives	Theoretical perspective / framework	Method (empirical / theoretical)	Main findings	Journal
Watanabe & Fukuda	2006	To analyze the significance of a systems concept of coevolutionary dynamism involving in an ecosystem.	Reviews mutually inspiring cycle between Japan and the US and its consequence to the National Innovation Ecosystem	Comparative empirical analysis of the development trajectories in the US and Japan	The authors highlights the following policies: Technology policy should endeavor to generate innovation in a way to constructing a co-evolution between innovation development cycle and advancement of the institutional system. Given the systems efficiency in constructing the above coevolutional dynamism, potential resources in innovation should be effectively explored and utilized in a systems perspectives. Provided that seamless, all actors participation and on demand institutions requirements characterized by a ubiquitous society, multi-layer mutual inspiring cycle should be constructed in a global context.	Journal of Services Research
Ahner	2006	To highlight the significance of having a systematic approach for analyzing the risks in an ecosystem	N/A	N/A	Main conclusion: If managers learn to assess ecosystem risks holistically and systematically, they will be able to establish more realistic expectations, develop a more refined set of environmental contingencies, and arrive at a more robust innovation strategy.	Harvard Business Review
Iyer & Davenport	2008	To present and discuss Google's innovation ecosystem	N/A	N/A	The key attributes of Google's success are: strategic patience, infrastructure built to support innovation, architectural control, innovation built into job description, cultivated taste for failure and chaos, use of data to vet inspiration	Harvard Business Review
Carayannis & Campbell	2009	To provide a better conceptual framework (Mode 3) for understanding knowledge-based and knowledge-driven events and processes in the economy, and hence reveal opportunities for optimizing public sector policies and private sector practices.	Mainly discuss the underlying assumptions of the model to be presented	N/A	Mode 3, in combination with the broadened perspective of the Quadruple Helix, emphasises an Innovation Ecosystem that encourages the co-evolution of different knowledge and innovation modes as well as balances non-linear innovation modes in the context of multi-level innovation systems. Hybrid innovation networks and knowledge clusters tie together universities, commercial firms and academic firms	Int. J. Technology Management
Rohrbach, Heitz & Gemünden	2009	To analyse to what extent the open innovation paradigm has been embraced inside the Deutsche Telekom	Brief review of the changes experienced in the industry and the research on open innovation	Single case study design involving 15 in-depth interviews with Deutsche Telekom members and partners	Deutsche Telekom uses most of the benefits of open innovation without betting its survival on an open innovation future.	R&D Management
Tassery	2010	The paper is based on the assumption that the neoclassical view is inaccurate and that a new innovation model is required to guide economic growth policy. Having this in mind he provides rationales for this assumption.	N/A	Secondary data	Proposes a new manufacturing policy model	J Technol Transf
Samila & Sorenson	2010	To explore the extent to which the local availability of venture capital might act as a catalyst to commercialization	Literature on venture capital	Unbalanced panel data set of all 398 Metropolitan Statistical Areas in the U.S. from 1995-2002.	Show the relevance of the availability of venture capital to explain differences in metropolitan statistical areas	Research Policy
Mercan & Göktaş	2011	To explain the effects and magnitude of effects of components above on innovation making based on Global Innovation Index dataset.	Innovation systems approach, its evolution and innovation ecosystems	Data from Global Innovation Index (2009-2010 database), regressions	The interaction between universities and for-profit industries accelerates innovation making. The findings showed a positive but insignificant relationship between level of innovation culture and innovation output.	International Research Journal of Finance and Economics
Mezzouh & Nakera	2012	Considers the manner in which new business ecosystems develop to support innovation and strategic choice	Briefly summarizes the steps from systems to ecosystems of innovation	Case study of Cytale (French start-up)	Introduces the concept of "keystone innovations" and discuss how they affect business ecosystems	The Business Review

Table 1 Overview of empirical papers involved in the literature review

## Factors facilitating the open innovation process

Table 2 shows the factors seemingly facilitating innovation ecosystems as reported in the papers reviewed. The factors can be grouped based on the following dimensions: resources, governance, strategy and leadership, organizational culture, human resources management, people, partners, technology and clustering.

Factors supporting innovation ecosystems	Studies
<i>Resources</i>	
Resource management	Watanabe & Fukuda (2006)
Resource allocation	Adner (2006)
Resource availability	Tassey (2010)
Availability of different funding possibilities (private and public)	Tassey (2010); Samila & Sorenson (2010)
<i>Governance</i>	
Continuous investments in infrastructure	Iyer & Davenport (2006); Tassey (2010)
Architectural control	Iyer & Davenport (2006)
Rigorous decision making facilitated by data	Iyer & Davenport (2006)
Timing referring to all partners involved	Adner (2006); Watanabe & Fukuda (2006)
Systematic risk assessment	Adner (2006)
Democracy	Carayannis & Campbell (2009)
Own organizational structure	Rohrbeck et al. (2009)
Use of internet platforms to support and foster interaction between partners	Rohrbeck et al. (2009)
Flexible system that allows integration and expansion	Rohrbeck et al. (2009)
Clear role assignment	Tassey (2010)
<i>Strategy and Leadership</i>	
Patience	Adner (2006); Tassey (2010)
Clarity of purpose and attention to detail	Iyer & Davenport (2006)
Distant and distanced view on innovation	Iyer & Davenport (2006)
	Mezzourh & Nakara (2012)
<i>Organizational culture</i>	
Open to failure and chaos	Carayannis & Campbell (2009)
Innovation culture	Iyer & Davenport (2006)
	Mercan & Göktas (2011)
<i>Human resources management</i>	
Innovation as integral part of job descriptions	Iyer & Davenport (2006)
<i>People</i>	
Involving post-doctoral researchers to get access to worldwide R&D community	Carayannis & Campbell (2009)
	Rohrbeck et al. (2009)
<i>Technology</i>	
	Carayannis & Campbell (2009)
<i>Partners</i>	
Pluralism of a diversity of agents, actors and organisations	Carayannis & Campbell (2009)
Use of a variety of partners	Rohrbeck et al. (2009)
University - industry collaboration	Mercan & Göktas (2011)
<i>Clustering</i>	
Foster interactions	Mercan & Göktas (2011)

**Table 2 Overview of success factors facilitating innovation ecosystems**

The table indicates that especially the governance dimension plays a central role in innovation ecosystems which is easily comprehensible given the different actors and thus communication challenges that need to be coped with in such a system. Thereby the factor addresses areas such as control, structural and technological aspects, data management, data analysis and data processing. Moreover, issues related to flexibility as well as the form of governance are highlighted.

Additionally, strategy and leadership, organizational culture and partners are viewed as critical aspects that need to be carefully handled to increase the success of innovation ecosystems. These dimensions, too, are

understandable recalling the concept of innovation ecosystems as presented in section 2. These dimensions are closely connected to the dimension of governance as well. The remaining factors represent more or less individual entries and take account of the particular settings under investigation.

## CONCLUSIONS

This paper has reviewed existing articles that examined innovation ecosystems. More precisely, the interest was to identify factors that enable a successful implementation of innovation ecosystems. Given the assumed relevance of innovation ecosystems to innovative activities an understanding of those factors supporting its implementation is of utmost relevance. In addition, as the study of innovation ecosystems is still in its infancy the success factors identified may serve as a basis for future research directions.

Based on a literature review the authors identified nine studies which fulfilled the a priori set selection criteria. The small number of papers identified clearly underlines our limited body of knowledge regarding the topic. Current research in this area seems to be primarily driven by some researchers' personal interests. It can be thus concluded that the existing literature provides only rather fragmented insights into innovation ecosystems and their implementation in reality. Given the assumed importance of innovation ecosystems there is a need for more intense research activities. This would at the same time help to underpin the legitimacy of open innovation as a research field.

The review of the papers suggests that factors for the successful implementation of innovation ecosystems can be found in the areas of resources, governance, strategy and leadership, organizational culture, human resources management, people, partners, technology and clustering. These areas clarify that well-known aspects need to be addressed, thus the individuals in charge can to a certain degree built upon previous experience and existing knowledge, respectively, when setting up innovation ecosystems.

Considering the dearth of understanding, the authors see particularly four issues that need more attention and development:

- 1) The evaluation of innovation ecosystems. The actors concerned need to have measures at hand to better control and allocate their resources regarding different business operations. Given the scope of innovation ecosystems, these measures need to go beyond organization boundaries and to address all actors involved and their concerns. In addition, funding

parties will be interested in measures as well in order to better assess the return of their investments.

2) The role of people in innovation ecosystems. Innovation ecosystems comprise different actors with different goals, expectations and attitudes, so the authors of this paper call for more research on that topic as a deeper understanding of any supporting and hampering factors concerning the implementation of innovation ecosystems from a people-perspective.

3) The application of a variety of research designs and methods. Longitudinal studies would enable researchers to study innovation ecosystems as they actually unfold. In addition, longitudinal studies provides the opportunity to observe whether and how innovation ecosystems change over time as they mature or face new challenges, respectively. Using mixed methods research approached would also help to obtain a more holistic understanding of the subject of innovation ecosystems than is possible using mono-methods approaches.

4) Country-comparisons. Our understanding would also benefit from studies that discuss innovation ecosystems taking country differences into consideration. Is it plausible to assume that innovation ecosystems will vary from country to country (even region to region), reflecting each country's culture, individual systems and institutions. Therefore, comparative settings would clarify what factors are likely to remain constant under different conditions and what would change.

Moreover, based on our analysis of the definitions of innovation ecosystems, a better conceptual understanding will be essential in order to fully benefit from the analogy. For example, better conceptual linking is needed between innovation and ecosystem literatures. What are meant by different biological concepts in the context of innovations and human interaction? Is the concept of innovation ecosystem to be understood as a loose metaphor of co-operation beyond sectors or cluster borders or does it represent a comprehensive shift in mindset?

The present study is not without limitations. Complete coverage of all the articles considering innovation ecosystems may not have been achieved, given the search proceeding chosen. So it may have left out papers that also addressed innovation ecosystems but used different language. Finally, the success factors derived from the small numbers of papers need to be treated with caution.

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# Exploring Innovation – A Language Approach

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## ABSTRACT

*Innovation Management is a complex task that requires improved methods to support the exploration of multiple innovation dimensions. We suggest firms to adopt a language inspired approach in order to improve existing methods. The language approach is supported by a graphical innovation profile that maps the innovation features and choices. The paper demonstrates the applications and perspectives of this approach with reference to a qualitative case study.*

## KEYWORDS

*Innovation Management, Innovation Management Models, Innovation Viewpoints*

## INTRODUCTION

An important aspect of managing innovation is the ability to assess, review, and challenge a number of relevant parameters and viewpoints associated with the competitiveness of the product or service. Several empirical studies emphasize that successful innovation is more likely to happen when multiple innovation viewpoints are applied and are specifically impacting the final solution (Sawhney et al., 2006). The ability to apply multiple viewpoints can be referred to as one of the most important Innovation Management functionality parameters, and the result can be measured as an essential part of the innovation capability of the organization (Francis & Bessant, 2005). In essence, this multiple viewpoint ability is a transdisciplinary competence that requires methods to support communication and synthesis across traditional organizational borders.

## INNOVATION MANAGEMENT

The term innovation can in the simplest form be defined as "the successful exploitation of new ideas" (Francis & Bessant, 2005). In this meaning innovation becomes a core process for any firm or organization in order to survive or prosper. Being a core process requires that it can be managed and organized as a systematic activity (Drucker, 1994).

The important question is: How can we be supported in assessing, reviewing, and challenging the relevant competitive features of the current state of a given product or service?

This requires support from an innovation management model or framework. Every organization has to choose its own model or framework and make it an integral part of their overall management system. There are basically two approaches, 1) To develop a company specific model that fits the particular requirements within the relevant industry, or, 2) To choose a generic model that can be adapted according to the particular requirements within the relevant industry. The second option has several advantages. By choosing a generic innovation model it is easier to benchmark with other industries and firms; and due to the broader external documentation of the model it is easier to communicate internally within the firm.

### **Innovation models with multiple innovation viewpoints**

There are several generic innovation models available.

The Doblin Group studied a large number of innovation examples throughout the world. They identified ten main types of innovation and published their *Ten Types of Innovation* model in 1998. In 2011 the model was updated to reflect the experienced changes since launch of the original model (Doblin, 2013). The new model has ten types of innovation as well.

Sawhney, Wolcott and Arroniz identified 12 different ways for firms to innovate (Sawhney et al., 2006).

Francis and Bessant identified four ways of targeting innovation – the so-called 4P model (Francis & Bessant, 2005). The model has been refined frequently by updates in various articles and Innovation Management books (Tidd & Bessant, 2009).

The three models have a lot of similarities. However, the most important shared conclusion is that innovation is not a matter of product innovation in an isolated way. Their research document that isolated product innovation is not likely to be successful compared to an innovation effort that involves several viewpoints of innovation.

The three models also share two important challenges when the models are to be operationalized and integrated into a firm's management system.

Most importantly, all the illustrative cases that demonstrate the application of the innovation models are retrospective. This is naturally seen from a communication perspective and do serve efficiently in illustrating the comprehensive nature of the multi viewpoint models. However, any new application of the models will face a complex problem of how to use the models. The retrospective application of the models does always present a logically cause-effect relationship which is generally only known in hindsight. In a forward developing process the cause-effect relationships are generally blurred and ambiguous in nature.

The second challenge relates to the time dimension. In the multiple viewpoint models, as described above, the given innovation profile is represented as synchronous measures of the various innovation viewpoints. This is rarely the truth. Most often the innovation profile will develop over time in asynchronous steps.

The challenges will be illustrated and discussed based on the 4P model by Francis and Bessant (2005) in the next section.

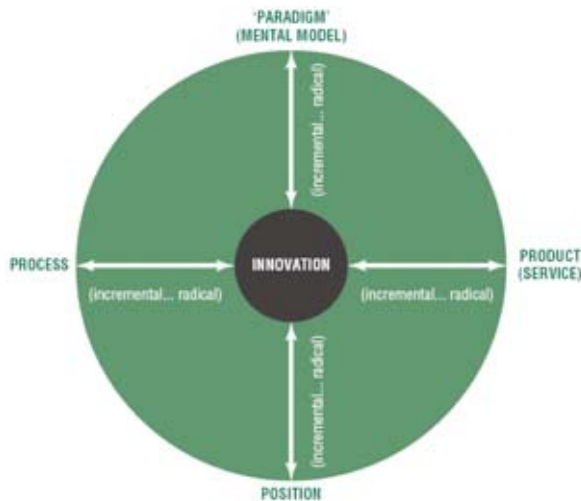
### **The 4P Innovation Model**

The 4P model is named after the four innovation viewpoints that are represented in the model: Product, Process, Paradigm, and Position (Francis & Bessant, 2005). According to the 4P model innovation can be targeted in four main ways:

1. Product – innovation to introduce or improve *products*
2. Processes – innovation to introduce or improve processes
3. Position – innovation to define or re-define the *positioning* of the firm or products
4. Paradigm – innovation to define or re-define the dominant *paradigm* of the firm or the industry

Francis and Bessant (2005) discuss the four innovation viewpoints and conclude that they are not tight categories and that they have fuzzy boundaries. Nor are they alternatives: firms can pursue all four at the same time.

Tidd and Bessant (2009) present an updated version of the 4P model and illustrate it as shown in picture 1. In this model four independent axes represent the innovation viewpoints and each axis indicate an incremental innovation effort near the center versus a radical innovation effort far from the center.



**Picture 1 The 4P Innovation Model (Tidd & Bessant, 2009)**

In their original application Francis and Bessant (2005) proposed to use the model as a classification of innovation ideas. The ideas have been produced through a separate process. This usage of the 4P model is quite similar to the proposed usage of the models by Doblin (2013) and Sawhney et al. (2006).

It is obvious that the models in this usage can support a management discussion about as well the potential configuration as the chosen configuration of a comprehensive innovation effort. The 4P model can support management in: 1) enlarging the choice of alternatives, 2) creating focus at critical areas, and, 3) identifying critical interdependencies between the various innovation efforts.

However, all this requires that the innovation ideas have been created in advance. Furthermore, it would be beneficial if the management discussions and the generation of innovative ideas could be supported systematically.

Such an extension does require additional supporting tools combined with various interpretations of the innovation model.

The authors have for the past 20 years been engaged in consulting and teaching innovation at Executive MBA level. More than 300 applications of the various innovation models have been applied to as many firms and institutions. The reflections in the next part of the paper are based on the experiences gained from active participation in these applications. Each firm has had their individual challenges and therefore there have not been a unified research setup. Our studies have been explorative, and, therefore, the following discussion is also explorative in nature.

## INNOVATION AND LANGUAGE

The simple definition of innovation: "the successful exploitation of new ideas", as described above, requires that the applicants are able to define the degree and the character of newness. Per definition this is unknown and has to be explored.

As the innovation dimensions are very different in nature it will also likely involve a number of cross-organizational viewpoints and often viewpoints from outside the organization. The cross-organizational and the inter-organizational perspectives require communication skills and methods.

The combination of 1) cross-organizational involvement, 2) exploration of the unknown, and 3) communication, sets challenging requirements. We have chosen to interpret these requirements as a request for the availability of a set of different languages that will facilitate the exploration of the relevant innovation viewpoints. Our drive for choosing a language approach is that it emphasizes communication and that it builds on the assumption that a language needs to be trained and further on refined in order to suit its purpose. If not trained and refined a language will develop into stereotypes that are not able to capture the fine nuances of a relevant subject.

### **Innovation as a questioning approach**

It is generally challenging to questioning into the unknown. The dimensions of the 4P model do, however, support in such a process. Examples of relevant questions to the four dimensions are:

- Product Innovation
  - What are the key technologies?
  - How mature are these technologies?
  - What is the key offering provided by the product?
- Process Innovation
  - What is the manufacturing/operational setup?
  - What is the logistic setup?
  - What is the competitive strength of these?
- Paradigm Innovation
  - What is the current assumption of a given product category?
  - How do people expect to benefit from the offering?
  - What are the current business models?
- Position Innovation
  - Can the products vary according to different customers?
  - Can the products be supplemented with complimentary products?
  - What are the known and unknown market spaces?

The questions have been extracted and generalized from the more than 300 empirical applications that forms the basis for this study.

By the questioning process it is revealed if there is an immediate answer. If there is an immediate answer it also indicates that there is a language that supports the further research of the question. Furthermore, this indicates in general that the specific innovation effort is more likely to be incremental than radical.

If there is no immediate answer it indicates an innovation challenge and a need to find an approach to start the research. Choosing an approach is similar to defining elements of a language to support the research.

In the following the questioning approach will be illustrated by extracts from one empirical case.

### **Case – LEGO Board Game**

After a severe financial crisis from 2000 to 2005 LEGO Company has regained competitiveness and have for the last 7 years experience two digits growth rates in both turnover and earnings. A recent expansion of the product portfolio is board games (LEGO Company, 2013).

Throughout the history of the LEGO Company, they have published many board games based around current product themes. The games have been developed and manufactured by sub-suppliers. In 2007 the whole board game setup was reconsidered and the conclusion was that LEGO needed to innovate the whole product setup.



**Picture 2 LEGO Gaming Dice (LEGO Company, 2013)**

The questioning approach revealed that most of the setup of the board game industry was well known both to LEGO Company and its competitors. Systematic questioning in the four dimensions of the 4P model indicated

that the most realistic dimensions to challenge where the product and the paradigm dimensions. These two innovation dimensions were challenged by introducing a new dice that do allow the players to change the sides of the dice (see picture 2).

In 2009 LEGO launched the product series with 10 parallel product set. All of the sets make use of the distinctive LEGO Dice - a solid plastic, LEGO-compatible cube with soft rubber rimming on each edge to give the dice a particularly strong bounce. Depending on the game, the dice can be built with different LEGO tiles on its faces, which will affect game play in different ways.

The new game setup does challenge most radically the product and paradigm dimensions but all four dimensions support the comprehensive innovation setup:

- **Product Innovation**  
The Game Dice with replaceable sides.  
Patenting the Game Dice (Gaming Dice and Game, 2011).  
The possibilities of making dynamic rules.  
The combination of existing product themes and games.  
Introduction of mini-mini-figures.
- **Process Innovation**  
The Game Dice molded in one piece.  
Use of existing sub-supplier setup.
- **Paradigm Innovation**  
Mothers can play LEGO with their sons and daughters.  
The new play experience of being able to change the sides.  
The mixture of game and building process.
- **Position Innovation**  
The widespread use of common LEGO bricks.  
Games based on existing LEGO themes, e.g. Harry Potter,

The listed innovation parameters don't tell the whole innovation story, but they represent what the product management and the initial product development team chose as the main focus areas.

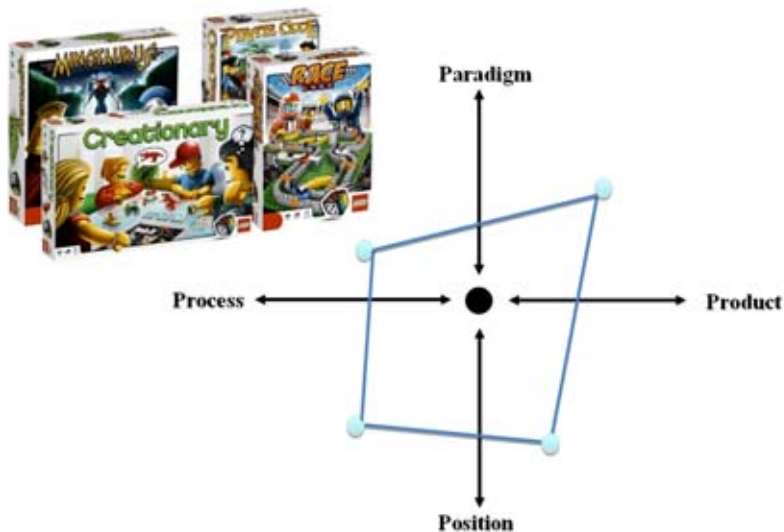
It is not possible to define general guidelines for a competitive innovation profile. This will differ from industry to industry. But it is possible to identify some patterns that should attract management attention and it is possible to identify approaches that facilitate the exploration of specific challenges. The last part is what we have chosen refer to as "languages". This part will be elaborated further below. In this discussion we will continue to delimit our discussion to the 4P innovation model and the LEGO case.



## INNOVATION LANGUAGE ELEMENTS

Each innovation dimension of the 4P model can be explored by questions, as described above. However, in order to create a dialogue and to be specific it is necessary to have access to a wider and more precise vocabulary. This wider vocabulary is a mixture of the specific conditions defined by the industry and various methods.

The dimensions of the 4P model can be explored in many different ways. The many cases have demonstrated that it is often beneficial to explore the dimensions in pairs. The LEGO Board Game case as described above can be illustrated graphically as shown in picture 3.



**Picture 3 LEGO Board Game and the 4P innovation model**

By exploring the innovation dimensions in pairs a graphical innovation profile emerges (see picture 3). The borders of the profile are indicating where specific and rich vocabularies have developed. Though the form of the profile is highly subjective (or collectively agreed) it have proved to have a strong impact in the process of challenging the innovation contributions.

The individual case of the firm determines the starting point and this is largely determined by how the problem is framed by the organization. In the case of LEGO the agreed challenge was to identify growth potentials outside the traditional LEGO market for construction toys mainly for boys.

Many firms separate the initial idea phase and the maturity phase (O'Connor et al., 2008). In the LEGO case three external consultancy companies were invited to submit ideas on what new markets LEGO could approach. Based on this input it was decided to focus on board games. After

the idea phase and the selection phase the incubation of the idea towards maturity was done internally and ended up with an innovation profile as described above.

The initial and most important step in determining the innovation profile was to explore the paradigm dimension. Board game is a large industry with big competitors and there are tough requirements to enter this market successfully. A paradigm break is the most powerful way of creating a competitive advantage.

However, a paradigm break is difficult because it doesn't yet have a language. The initial idea can be viewed as an abstract impulse but it remains abstract until more details are added. When more details are added nuances emerge and make dialogue and involvement possible.

The phase is best described as being complex. Complexity is referring to the fact that the relationship between cause and effect can only be perceived in retrospect. This means participants have to probe in order to gradually make sense (Snowden & Boone, 2007).

Several authors refer to the challenge of paradigm break as a process of reframing (Normann, 2001). Verganti (2003) supports the ideas of reframing, and, furthermore, point out the need for a language in order to express and discuss the idea. Finally, Duggan (2007) base his contribution on insights from recent brain research and make a direct connection between creativity and reframing of existing information in order to create breakthrough concepts.

A powerful language approach to explore this further is prototyping. Schrage (2000) promotes the viewpoint that prototypes create the space for innovation by providing the language that enables engagement. Prototypes engage the organization's thinking in the explicit. They externalize thought and spark involvement and dialogue.

The combination of constructing with LEGO and gaming was the initial bid on a paradigm break in the LEGO Board Game project. The further exploration was done by a number of prototypes. However, some of the first prototypes tested on potential customers revealed another potential paradigm break.

The test group reported an unforeseen feature of the LEGO Board Game. Mothers could now play LEGO with their sons. LEGO's traditionally male appealing construction theme has to a large extent excluded mothers to take part of the play. The board game approach changed this limitation and proved also to be less gender biased than the existing product portfolio.

The prototypes also support and allow for a gradual clarification of product specifications. This refers to the product dimension of the 4P Innovation Model (see picture 3). James G. March (2008) describes this phase in the following way: “Alternatives are not given but have to be discovered or created. Expectations are not known but have to be developed. That development introduces uncertainty and errors. Desires are neither clear, nor unified, nor stable, nor exogenous to the process of choice”. Brooks (1995) observes: “The hardest single part of building of a system is deciding what to build”.

The product specifications can be seen as the result of a process but the main part of the product specification literature are mostly concerned with the structure of product specification and less concerned with the process of creating the product specifications (Brooks, 1995). The relevant languages to apply in an exploration process should reflect this need.

The languages that stimulate the dialogue are mixtures of prototypes (Schrage, 2000), product specification (Pahl et al., 2007), concept generation (Goldenberg & Mazursky, 2002), technology s-curves (Christensen, 1992), and, technology maturity evaluation (Narayanan, 2001).

The initial specification in the LEGO Board Game case was challenged by the idea of combining the LEGO construction play and gaming. It was decided that the gaming should be guided by a dice; and that the dice should not be an ordinary gambling dice with six sides where each of the sides has a different number of spots (1 to 6).

Several versions of dices with alternative symbols were prototyped, and finally, the breakthrough emerged: The dice with replaceable sides and the combined noise reducing and stabilizing rubber protection (see picture 1). The innovation strength of the final solution was increased by the fact that the dice could be patented (Gaming Dice and Game, 2011).

The process innovation parameter in the 4P model is explored by means of various value-chain approaches (Fine et al., 2002). In combination with the paradigm innovation parameter it can be explored with a reframing perspective (Normann, 2001).

In the LEGO Board Game case the critical process innovation was the ability to mould the LEGO dice automatically in one piece. The mould needed new innovative features and ended up being the most expensive mould ever produced at LEGO. The rest of the involved value-chains were well known and largely reuse of existing setups.

The position innovation parameter in the 4P model is referring to the ability to increase market presence. Either by selling more to existing customers or by selling to new customers. Selling to new customers may additionally impact or change the profile of the whole firm.

When combining the position innovation parameter with the product innovation parameter the obvious language to explore this is product architecture (Sanchez, 2000). And, when combining the position innovation parameter with the process innovation parameter the obvious language to explore this is process architecture (Anderson, 1998).

As can be seen in picture 3 the LEGO Board Game project is assumed to have a significant position innovation contribution. This is largely explained by the modular structure in both product and process (Sanchez, 2000).

## CONCLUSION

By adopting a language approach to the specific innovation exploration methods we have experienced a strong support to the cross-organizational dialogue and discussion that is crucial in the innovation process. Based on the well-known 4P Innovation Management model we have added the language approach and demonstrated that an innovation profile can be developed. Within the borders of the innovation profile there have been developed languages that more efficient support the transformation of abstract impulses to more specific features with a wider and more precise vocabulary.

Though the empirical study has included many firms the result is still mostly qualitative and the specific innovation profile will only make sense within the development team and the associated management. However, in this usage the profile has proven beneficial in order to specify and challenge innovation features.

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# The User as a Relational Category

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## ABSTRACT

*Much has been written about “the user” giving a reductionist portrayal of the human relationship with technologies. We argue that equating “user” with flesh and blood “people out there” is naïve. The user is better understood as a relational term that bridges between people out there and renditions of them relevant for design. This helps provide needed vocabulary and re-focus human-centred design in regard to some of its persistent sore points. The “field site” of human-centred design turns out to reside as much within R&D organization as it does “out there”. Descriptions of users would benefit from being more strategic in order to become viable amidst other design concerns, and so would the managing related to the design of use.*

## KEYWORDS

*User, Human-Centred Design, User Representation, Use, Design*

## INTRODUCTION

The user has for long been a lingua franca term used by technologists to refer to people engaged with their products. Perhaps due to this legacy, advocates of more human-centred design also routinely deploy it. In this latter context deep ambiguity towards the term prevails. Much has been written (present authors included) about “the user”, giving a reductionist portrayal of the human relationship with technologies. Alternative terms could be used instead.<sup>i</sup> Yet, none of the alternatives has been close to supplanting “the user”, not even in the human-centred quarters of designing.

The last few years have seen a more nuanced response to “the user”, examining what the term does, what it highlights and what it conceals. In design studies Redström (2006, 2008) has emphasized how the move towards interaction design and user experience design has in fact led to

misplaced idea of user “fit”, in that the whole of user action and interpretation should become designed:

“There is a fundamental difference between designing things to be used and trying to design use or the user experience. To say that designers should refrain from overdetermining use and users is not to say that ideas about use should not be part of our concern or even that it should not be our main concern, but that we need to acknowledge what it is we are designing and what falls outside of that. This is why the shift from object to user as a basis for design is so problematic: it blurs basic conceptual distinctions between the design, the interpretation, the experience, the use and the appropriation of an object.” (Redström, 2006, 135)

Redström further suggests that we move from static designer–user categorization to examine the activities that give shape to technology. User-centred design (UCD) is in fact “use-before-use”, anticipating the usages before the rich and myriad engagements with technology have taken place. When the engagements do take place, there is shaping of design-in-use and often, also, explicit “design-after-design” by users as well as by designers (Redström, 2008; see also Whalen & Szymanski, 2011; Botero & Hyysalo, 2013).

So designing objects, systems, services, and artefacts are one thing, their appropriation, adaptation and experiencing are another. To bash “user design” for conflating these basic conceptual distinctions may help in fostering more reflexivity in some quarters of human-centred design. Yet taking the potentially conflating character of “the user” seriously, we argue, is key to untangling another set of often tangled facets of human-centred design that persist, even when it is not seeking to overconstrain use.

## THE USER, USE AND DESIGN

By taking the notion of the user seriously, we do not mean reinstating the well-argued case for studying the potential adopters as grounding for design. We mean taking seriously that the factual referent of “the user” even in human-centred design studies is strictly speaking never the flesh and blood person or people “out there”. The user refers to a relation, not to an entity with common properties. It bridges between people out there and a rendition of them that is relevant for design. This is readily visible in reports and outcome briefings that designers, marketing departments and so on produce. The reports of “out there” reality are quite different from what anthropology, psychology or sociology would produce of the same people. Their studies are conducted for other aims, and indeed, “patients”, “citizens” and “natives” are equally relational terms and equally edited renderings for particular purposes.<sup>ii</sup> This proposition is not new or

particularly radical. Anthropology standardly notes how its research is equally about the familiar (home) and the strange (the field) (e.g. Geertz, 1973; Latour & Woolgar, 1979).

But what is interesting, and perhaps even a little radical, is to examine, what then is *specific* about the relation that “the user” foregrounds, for it precisely blurs the “basic conceptual distinctions” some may find worrying:

“The ‘user’ is a complex idea: on the one hand, it is a category used by engineers and developers to refer to those who may eventually use their systems, on the other it can refer to a range of other individuals and institutions, imagined and real, some of which begin to develop various kinds of engagement with a technology over time.” (Stewart & Hyysalo, 2008)

The blurring becomes most evident in that the birth of the user of a technology-in-the-making can predate, even by decades, the first actual people to form a direct using relationship with it (e.g. Flichy, 2006; 2007; Höyssä & Hyysalo, 2009). Many technologies remain with these envisioned users and never find their way to their (hoped for) flesh and blood counterparts. This does not mean that such users would be irrelevant or illusory. The users of not-launched technologies are often elaborated in great depth in product descriptions and requirements specifications, and prototypes adjusted meticulously to their needs. Because of the real consequences for requirements and projects, this sense of the user is very real to designers in a psychological social and often material sense, even if a year later another understanding of the user has replaced it or the technology project has been scrapped altogether.

The notion of user, hence, refers to imagined, implicated, potential or real people, who are or could be using a designed object (artefact, technology, product, service or infrastructure).<sup>iii</sup> It refers to the result of a particular relation, an engagement that people come to form with objects in the course of their appropriation, their “usership” (Kjellberg & Helgesson, 2009; Redström, 2008). Yet out of this relation it foregrounds a design oriented rendering of how people act, think and experience artefacts—and it is not “just” about realized use.

The focus on user as a relational category helps draw our attention to one set of conceptual processes by which agreeable correspondence between intention, design and interpretation and appropriation is practically achieved (Crilly et al 2008). This is particularly so in relation to more complex and open artefacts. Indeed, the practical achievement of communication through verbal, literal, TV, movie or any other culturally highly conventionalized medium differs markedly from the launching of



new types of products such as the initial attempts at designing the digital environs that later became known as social media sites.

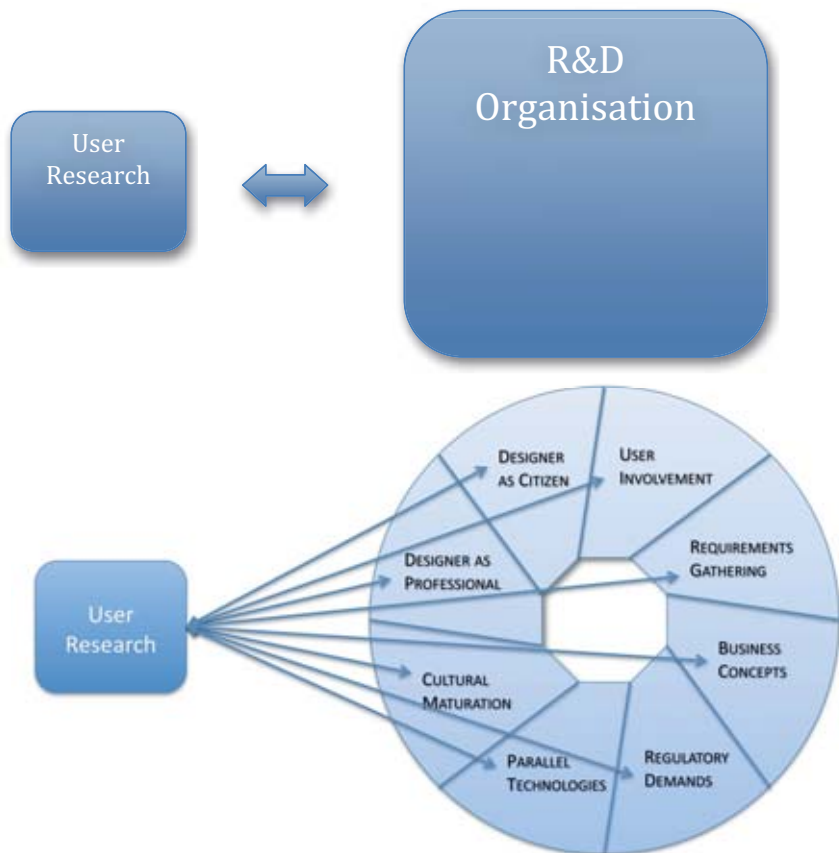
## USER, ITS REPRESENTATIONAL EXISTENCE

Our definition of user, above, entails that “representation” can appear as a redundant addition to user understood as a relational category. We find it useful, however, to differentiate between the strictly speaking representational existence of the user (user representations, be these mental, social, physical or bodily) and the lived existence of people who interact with technology (flesh and blood user, someone who has or had a relationship to the technology). This is not least because flesh and blood usership is an emergent relationship that requires attending in use situations (Hennion, 2007; Helgesson & Kjellberg, 2009; Redström, 2008), yet these same flesh and blood people have user representations of themselves and of others in relation to a range of present and future technologies even before they have factually become users of these technologies. User representation is hence a way to keep those “basic definitions” clear without obfuscating the user as just one or other aspect of its relational existence.

Research on user representation is worth turning to for several reasons. For one, it has matured to be fully design relevant only recently despite having emerged 20 years ago in the field of science and technology studies (Oudshoorn & Pinch, 2003). Their early studies highlighted how the referent of “the user” was not necessarily any person out there, but often derived from developers’ own imagination and professional priorities (Woolgar, 1991; Akrich, 1995; Cooper & Bowers, 1995; Agre, 1995). Research since, has revealed that the dominant source for designing the user has much more variety, up to 30 different sources being cited as a key source of a user in particular design projects. This current body of research helps address how designers as professionals “who anticipate use” are positioned in R&D organizations (Williams et al., 2005; Kotro, 2005; Hyysalo, 2010; Konrad, 2008). At the same time, this research foregrounds the importance of materiality in user representations and their ties with different professional ways of knowing (Kotro, 2005; Johnson, 2013). This has included a move from the intentions and values of designers, to investigating in detail the processes and operationalizations of user representations in design, a timely issue in design research more generally (Crilly et al., 2008, 444; Hyysalo, 2010; Ylirisku, 2013; Buur & Sitorus, 2007).

What this research indicates is that the range, kind and background of user representations that are circling around a given development project tend to be many. “User knowledge” does not only emanate from user experts and “other knowledge” from other professionals. Neither is it the case that (human-centred) designers would have their “design knowledge”, “professional knowledge” and a separate body of “user knowledge” that originates only from the future adopters. Indeed, designers have begun to take issue with such simplified understanding of what ‘human’ in human-centred design means, not least because it denies many of the implicit forms of knowing the users, the very area that designers have prowess in (Löwgren & Stolterman, 2004; Cockton, 2012).

This further entails that the relation of users and design is not a simple question of “impact” or “operationalization” of user research, but an issue of mutual relations and interactions between different user representations, artefacts that carry them, and people related to the design project with their own specific ways of knowing and materializing of their knowledge (figure 1).



**Figure 1** User research's impact seen as that driven into the organization (upper image) and as an interaction within complexly intertwined extant sources of user representation (lower image)

User research appears, therefore, to be more complexly intertwined into the design organization than e.g. UCD standards would like it to be, with the elaborate recipes for how to “drive” user research and its results in organization shooting somewhat off the mark (e.g. Kuniavsky, 2003; Beyer & Holtzblatt, 2005).

## USER, AND ITS YIELD FOR HUMAN-CENTRED DESIGN

We have sought to clarify the reality of user as a relational category and now wish to turn to its practical implications through a set of propositions about often lamented issues that decrease the effectiveness of human-centred design.

- 1) *It is difficult to assess what is news and what is not in the user studies or what new knowledge is needed.* Design critics of UCD commonly lament that user studies produce information already known to designers (Cockton, 2012), and fail to provide design insights that are truly needed. UCD practitioners in turn commonly lament how little investigation is possible within project constraints. **By expanding the user studies landscape via the notion of user representations, it becomes clear that human-centred design representations of the user are not the only ones in any design organization.** All user representations build on experiences and interpretations of design and appropriation of previous artefacts – be they everyday, professional learning or scientific inquiry. The relative adequacy of a given source differs with regard to what kind of constellation between design and use has prevailed over time, how effective and extensive social learning processes have been to date, how much the development project at hand differs from earlier ones, and what kinds of instruments are available to facilitate the articulation, and finally, what is strategically important knowledge to generate. User representations can be used as a vocabulary to elaborate and communicate these understandings and link them to determining what new information is needed from user studies and which aspects of the extant information need verifying.<sup>iv</sup>
- 2) *Companies act against the results of user research or disregard them, and it is difficult to argue which understandings of the user are adequate and which are not.* UCD practitioners appear to face frequent challenges in advocating their view and findings in design

organizations, judged by, for instance, the “common last chapter” in UCD books, which provides tricks for how to advocate UCD findings and overcome incredulity in one’s own organization (Kuniavsky, 2003; Snyder, 2003; Beyer & Holtzblatt, 1999; Preece, 2002). Given that it is rare (if not impossible) to ground all design decisions in user data, others in the same design organization will also continue to have their own ideas about products and users – and equally continue to get them incorporated within products. **What these collections of tricks do tell us is that advocating “truth from the outside” might more fruitfully be replaced by dialogue over different user representations and their sources and grounding.** Used in this manner, understanding “user” through the notion of “user representations” provides support for cross-functional decision making in various product and product family boards. It could help reduce the uncertainty about actual use practices, which – in addition to market insights, the competition, and chosen technologies – restricts and enables specific future pathways for the product or service.

- 3) *The uptake of human-centred design studies does not find itself adequately into products, or the core insights and requirements about users become compromised during technical design.* The bag of tricks for advocating UCD within an organization is paralleled with another one that is driving its results through technical realization. Use of design rationales, project reviews et cetera have their known shortcomings (Schaffer, 2004; Righi & James, 2007). **User representation studies provide a vocabulary for the inevitable transformation of use related aspects that takes place in the course of the realization of a product, its “chain of translation”** (Latour, 1999). The vocabulary helps to underscore how different materializations are differently compatible with, and inviting to, the incorporation of other types of user representations and different kinds of knowing. This could help in arguing why UCD reviews or consultations need to be regular and set out in sensible manner during technical design (to avoid the detrimental level of erosion or accumulation of some key user representations). A focus on transformations of user knowledge during technical design may also help practitioners devise new means for clever UCD engagement during technical design work.
- 4) *User research is limited to superficial aspects of the product design only (such as look and feel), or its effective deployment would mean questioning the assumptions and processes that govern how R&D is*

*being done at a company.* This concern has been voiced in many attempts to integrate UCD to software development methods (Wixon & Ramey, 1996; Lauesen, 2007; Mayhew, 2001; Cooper, 2004), as well as by the manifestos for entirely re-organizing company R&D to become human-centred to the core (Beyer & Holtzblatt, 1999). **Focus on user representations entails an emphasis such that representing users is not limited to epistemic issues, but underscores organizational and professional power play and interactions including decision making bodies, factions, interests, coalitions, inclinations, and strategizing.** Seeking to convey “neutral and reliable” information is just one strategy to persuasion in the making of design decisions. Critical, value-sensitive and participatory design have developed means for assessing and positioning user driven efforts to such organizational realities (Bødker et al., 2004). Our work on user representations underscores that making it visible is to invite scrutiny (Foucault, 1995), and this also goes for user representations that product designers hold. The adequacy of engineers’, CEOs’, or marketing department’s user representations can be brought to joint deliberation only if they are surfaced and not exercised covertly. Indeed, many designers and user advocates do not have the mandate or courage to question organizationally powerful occupational groups’ ideas about users. Making them visible with seemingly neutral tools and presentation mediums can then help to drive the process without being pushy beyond one’s position and accepted limits of inquisitiveness set by e.g. IPR.

Our propositions in this section rest on the ideal of a “somewhat reasoned deliberation” in design organizations. We do not invite some form of “über-reflective design” or “paralysis by analysis” but rather seek to bring clarity or “guideposts” to the issues about “the user” and user research that practitioners both wittingly and unwittingly grapple with. Certainly, many human-centred design projects simply cannot or cannot afford to enquire deeper into the sets of user representations that circle around the development project. But often the most important representations are right there and readily observable or are even a matter of asking. Our message, hence, concerns at least as much the management of human-centred design: human-centred efforts are only as good as they can get to be.

## CONCLUDING REMARKS

By sharpening the definition of the user and focussing on user representations and the processes that create, maintain, and transform them, we can reframe human-centred design and user research in a way that hopefully increases their relevance to design organizations.

A first step is to bring in the diversity of user representations that flow in design organizations. Co-design workshops, videos of users in their use context, user requirements, scenarios, and persona descriptions are but a few user representations. Use and users are equally shaped by business concepts, regulatory demands, parallel technologies, cultural maturation of interface genres and expectations, designers' professional knowledge, and common sense. This diversity of user representations allows a reframing of user research from a focus on the everyday life of users to the relationship between use and design. It means a rethinking of the field site: it is not only “out there”, but just as much inside the design organization. It means starting from existing user knowledge of developers, marketing people, managers, and other relevant stakeholders. It means constructing an overview of established user representations, considering which are mainstream and which are marginal. It means thinking of user research as an intervention to established mainstream user representations and locating the field study and field site with these prerequisites.

A relational understanding of “the user” and a distinction between user representations and situated use help decipher the dynamics by which the post-launch interpretation and appropriation of new technology is anticipated during the design and planning processes before market launch. Audience reactions are anticipated by active representational work that links different aspects of novel objects to their respective social contexts (regulation, business, technology, usages) and often, by proxy, to those parts of the development organization that (assumedly) hold competence in the area. This anticipatory representational work in design “endogenises” (a part of the) audience interpretations, rendering them manageable as part of the communication involved. Indeed, the user (as a relational category) is one of the means designers use to accomplish how potential problems of interpretation can be identified and expressed (Crilly et al., 2008, 440). The question, however, is not so much what an isolated product or product feature might mean, but how their meaning becomes constituted within the circuits of production and consumption (Silverstone et al., 1992; du Gay, 2000; Latour, 1991; Kotro, 2005; Pollock & Williams, 2008), and how these are further enmeshed in product, company, and industry lifecycles as well as in user practices.

Finally, a clear distinction in design talk between user and user representation can deliver greater clarity of the complex conceptual terrain to practitioners and students. The notion of user representations invites being used strategically: when there is talk about users, but it is not yet clear which individuals to engage with, one can consider what the features of a beneficial user representation are and how they could be pruned during the design process. That is what designers most need to identify, express, and frame about future interpretations.

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- <sup>i</sup> Social Actor, Participant, Stakeholder, Actor, Role holder, Utilizer, Subject, Human, and Agent are among the usual alternatives given.
- <sup>ii</sup> For those doubting how significantly human-centred design efforts edit the reality they study, we advise acquaintance with the total observation exercises of the 1950s (see Becker, 1998, 67-83). Less academically we might entice any potentially doubting reader to mark down all those moments s/he personally thinks him/herself as a user during the day. For us at least, those moments are rare, we rather mostly do or contemplate things with objects rather than feel our existence reduced to user relations. So whilst there is no doubt that “user” is a members’ category, it is seldom a category people use of themselves, rather one they use of others (with technology and predominantly in designing or producing it).
- <sup>iii</sup> As is commonly categorized, we also see this including those who directly operate the technology often called direct or primary users, as well as those who provide feeds to the technology, who help keep it working, or whose actions are directly affected by the technology, even if they do not directly operate it or use it only in rare intervals; i.e. those often called secondary users. There are also those implicated by the use of the technology such as patients, whose bodies are penetrated by the use of surgical instruments without the patients doing anything much with the instruments. The cleaner of the surgical premises is another implicated user, as s/he may is never even be aware of the instruments used, although they affect the kinds of mess and kinds of hygiene s/he has to deal with. Such implicated or simply co-present characters may or may not be characterised as users depending on the heuristic used to identify users.
- <sup>iv</sup> Being able to elaborate the key user representations that prevail in the design project, company and/or technological field could, in principle, greatly facilitate the positioning and uptake of whatever user representations user researchers offer. On the one hand, this opens opportunities for commissioning user research. It should help to provide user researchers a relatively encompassing set of user representations to start off with so that they can position their findings more accurately to what the development team thinks about the user. (Alternatively when truly “non-positioned” results are desired, the company should be very clear about this in its commission, to avoid the likely guesswork about what information may be useful). On the other hand, human-centred design could increase its effectiveness by not just going out and studying few people, but departing from positioning the design project at hand in an arena that already has user representation at play. The key issues to enquire are what are dominant user representations within the project, development organization and the industry field, and how they may be changing, i.e. how do they relate to project, development, and industry lifecycles.

# Design ecosystems as the landscapes for co-creation

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## ABSTRACT

*This paper presents a very compact view of design, design processes and practices that forms a foundation for the concept of the design ecosystem. Design ecosystems are systems of connected and interacting designs, organized by the practices of the human participants of the ecosystem. The design ecosystem forms the context for any new designs and to creative activities, thus forming also the landscape for co-creation. Practices are also designs, and the design and adaptation of practices is the most common design activity for most people. Practices have an individual and a social dimension. New design is always based on earlier available design which forms the design toolkit. The abstract space of possible designs that can be achieved with the current resources, capabilities and constraints is the design space. Design platforms are dominant components especially in digital design ecosystems. These concepts are helpful for supporting a design-oriented analysis of diverse everyday life phenomena and provide tools for discovering opportunities for design.*

## KEYWORDS

*Design Theory, Design Philosophy, Design Ecosystem, Design Toolkit, Design Space, Design Process, Design Platform, Evolution of Designs, Design Evolution, Emergent Design, Practices, Individual Practices, Social Practices*

## OVERVIEW

In this paper I introduce a set of concepts that I believe can be useful for understanding and analyzing the circumstances of co-creation and of everyday life phenomena from a design point of view.

I am proposing a set of concepts that are all linked to the phenomenon of *design*. The word "design" is used to convey many meanings: phenomena, processes, activities and outcomes. As this can easily lead to confusion, I will make an effort to clarify how the word is used in this discussion. In

addition, I will discuss concepts such as *design ecosystem*, *design toolkit*, *design space* and *design platform*.

As a starting point, I propose that it is useful to consider the creation and emergence of *all kinds of structures and things* as *design processes*, and their outcomes as *designs*.

This gives us a common framework for seeing parallels between such different processes, and it makes it easier for us to consider the crucial roles of the ecosystem of other designs and of the different actors present in these design processes. It will also be easier for us to consider and design changes to these processes, if we have better tools for conceptualizing them in more unified ways.

Due to space constraints, I must concentrate on presenting my point, and I am not able to present the diverse other views and the intellectual history concerning these topics adequately well in this paper; I apologize for that.

## WHAT IS “A DESIGN”?

The most common idea of design is probably connected to industrial production and to the creations of well-known designers. For example, we may recognize a famous design and even know the designer's name. Or, we may consider that a certain company is famous for paying special attention to the design of its products. In such a context, 1) a design is a description of a product that will be produced by a mass manufacturing process; 2) the design is created by a professional designer, who is typically educated in a design institution; 3) the design process is initiated and commissioned by the enterprise (the client) that will make and market the product; 4) the designer receives instructions from the client and a compensation for her contributions.

While there are an infinite set of variations of this pattern in various fields of design activity, these 4 main points fit well a very large class of design activities taking place in the world.

However, there are many kinds of design activities and processes that differ from this pattern, and it is a key aim of this paper to highlight their significance.

Design literature and design professionals do not have a clear consensus of what constitutes design. There is no single definition of design that the field would accept unanimously. The attempts to define design tend to either focus on the pragmatic point of view of describing what professional designers do, or to attempting to create a more abstract definition that

would embrace the much wider space where design is seen, and could be seen, to operate.

My approach belongs to this latter direction, and I admit upfront that I will take it to extremes, but for what I believe are good reasons.

The greatest difference in my position compared to most definitions of design is that I believe it is more useful to *connect the idea of what design is to the designs* that are created in various design processes, rather than to the characteristics of a creative intentional design process.

What this distinction means in practice is that *I believe it is meaningful to consider something that exists in the world and exhibits design as a design, regardless of how that design came to be.*

The other approach that focuses on design as an intentional creative activity will consider something as a design *only if it was produced by an intentional design process*, which always requires the involvements of human beings, and at least some extent of intentionality towards producing a design. This leaves out processes where humans are not the main actors and those where design-like results emerge without clear intention, as well as subjects the whole discussion to the ability to find out how the design came to be.

In this paper, I will call my approach as the *wide idea of design*, and the other one as the *narrower idea of design*.

Thus, according to both of these approaches, an industrially produced chair has a design. Instead, a spider's web has a design only according to the wide idea of design, while according to the narrower idea of design the design of the web is not intentional and thus does not count as a design.

The benefit of the wider idea to this discussion is that it enables us to discuss a much wider set of things as designs, and to consider a much wider set of processes as design processes. This view is in my opinion a prerequisite for a realistic discussion of designs, because designs that exist in the world have their impact on it regardless of how they came to be. By separating the designs artificially into completely different categories based on whether they were intentionally designed complicates the analysis and obscures important characteristics of the systems that these interacting designs form.

While I am not the only one taking a wider stance to design, I believe that as I take it to extremes, I can not claim that anyone else agrees with my view at this point. Very wide understandings of design are exhibited for example in the following writings (Cross 2011; Dennett 1995; Krippendorff 2006; Nelson and Stolterman 2012; Papanek 1971; Steadman 2008), and

some of them offer significant support to my position. Unfortunately, a detailed analysis of the differences does not fit into this paper.

Also unfortunately, I can not yet present a clear definition of what is a design. I have many questions in my mind regarding where to draw the boundaries of that concept. However, I can provide list of examples of things that I believe do have a design:

- a chair
- a human being
- spider's web
- marriage
- parliamentary democracy
- intellectual property law
- Einstein's theory of relativity
- Japanese language
- my personal digital ecosystem
- my practice of making breakfast

Thus, for the next sections of this paper, I can summarize that according to my position, in addition to such things as artifacts, also language, music, concepts, systems, practices, organizations, regulations and human beings count in my discussion as things that exhibit designs.

A chair is not a design, but it has a design. The design consists of characteristics such as

- structure or form
- properties, functionality or behavior

## THE DESIGN PROCESS

Based on the idea of design presented above, what then is a *design process*?

In my view, designs (as explained above) come to be through various kinds of design processes.

One kind of a design process is the intentional, professional, industrial design process described above. However, this kind of a process is responsible for only a minuscule minority of all designs in the universe.

Most design in the universe is *emergent* – designs have emerged through some kind of evolutionary process. Most people are familiar with the idea of Darwinian biological evolution, but evolutionary theories are also used to

explain the formation of other, non-biological, aspects of our material reality. Cosmic evolution describes the evolution of stars and planets, chemical evolution describes the evolution of various chemical substances, geological evolution describes the evolution of continents, seas and various geological strata of our planet (Chaisson 2007; Christian 2011).

The current consensus appears to be that biological evolution became possible after cosmic, chemical and geological evolution created appropriate circumstances for the emergence of life. Biological evolution has proceeded very rapidly compared to the earlier evolutionary stages and altered the design and characteristics of the earth very much. After human beings appeared, as products of biological evolution, the most powerful evolutionary process has been cultural evolution, which has had even more rapid and profound impact on the earth (Bellah 2011; Boulding 1978).

These various evolutionary processes are all design processes. My position is that these *theories of evolution are theories of the evolution of design*.

A key aspect of all evolutionary processes is that they include mechanisms for reproducing designs and thus making them persist. All designs are built on and made possible by earlier persisting designs. All designs that can be reproduced and can persist, thus create new possibilities for further design that builds on them. This makes another key aspect of all evolution, the *accumulation of design*, possible (Dennett 1995).

As mentioned above, emergence of life required certain circumstances that were created by earlier cosmic, chemical and geological evolutionary design processes. Emergence of human culture required the emergence of the design of the human species and many of its design characteristics, such as a mind that is supported by a large and flexible and versatile brain, created by biological evolution.

The emergence of human beings made, arguably for the first time, intentional, or at least large scale cumulative intentional design possible (the extent of design and its intentionality among other species in the animal kingdom can be debated (Hansell 2009); however, it is clear that no other species has similar abilities to communicate and accumulate designs, which makes the design of humans so efficient and impactful).

Thus, for those in favour of the narrower idea of design, there was no design in the known universe before the emergence of human beings.

In my view, design did take place before humans, but human beings and their ability to design intentionally has been a great leap in evolution, as intentional and culturally cumulative design has made the evolution of cultural designs radically and dramatically faster than the mechanisms of earlier evolutionary processes.

Human communication, learning, division of labour, collaboration, specialization, and the ability to design in imagination as opposed to only trial and error are examples of characteristics that make human cultural evolution of designs different from earlier evolutionary processes, and so efficient and impactful.

Cultural evolution thus differs from non-human evolutionary processes because of special cultural traits and because of purpose and intentionality. However, all cultural designs have most probably not come to be as results of very purposeful and intentional design activities. Many characteristics of human life and practices share a common ancestry with other animals, and have deep history in our evolutionary origins. Equally, even the purposeful and intentional design activities produce designs that may or may not be adopted by the society, depending on their compatibility with various other characteristics of life and existing practices and needs that are subject to various evolutionary pressures.

Thus, even the intentional design of humans still exists embedded firmly within an evolutionary framework of cultural evolution.

Based on this, what can we say of design processes? We know all kinds of things about how intentional design works. We also have studied human history, inventions and many other aspects of society and its evolution. Biologists and ecologists are exploring how the designs of organisms and their behaviors and practices have come to be. Various sciences are considering the other evolutionary processes. However, due to the scale of the variety of designs and their origins, there are only a few things that we can attribute to all design processes:

- all designs come to be and persist within an evolutionary context
- all designs build on earlier designs that make them possible – design can not make sudden leaps over required steps

What is the significance of this wider idea of design to the study of intentional human design?

When we expand the idea of what a design is and what kinds of processes create designs, we can have a more open mind to seeing designs in society and to studying their design processes without the handicap of always having to find the intentional designer. If we do not worry about the intentionality and can accept various structures and forms as designs even if they have emerged in a process we can not understand, we can take them better into account as things that have the same kinds of impacts as intentional designs do. Even if a design has emerged without us knowing its designer or the details of the process that created it, we can still aim to take advantage of it as a building block, or as a model, and for example modify

it. If we think of all such structures as designs, we may be able to better take advantage of the various parallels and analogies they and their various evolutionary paths may show.

My position is also that the wide idea of design is necessary because it lays an important foundation for our understanding of ability and need to design as a fundamental human characteristic and builds support for the idea that it is necessary to consider that human beings should have a fundamental right not only to enjoy culture but to design new culture, based on the culture that exists.

## PRACTICES AS DESIGNS

The wider idea of design I promote here also considers that things such as social and individual practices are designs, regardless of whether they evolved through intentional design activities or emerged in some undocumented social or individual process.

That a practice can be thought of as a design is easy to accept in such fields as service design; it is not hard to accommodate the thought that the way how a service is delivered in the form of some practices is intentionally designed and exhibits a regular set of forms, that can easily be accounted for as a design.

While there is a lot of recent literature about practices (Reckwitz 2002; Schatzki, Knorr-Cetina, and Savigny 2001; Schatzki 1996, 2002; Shove, Pantzar, and Watson 2012), the contributions do not usually take a design point of view towards them. Notable exceptions: Korkman (2006), Shove, Watson, Hand, and Ingram (2007).

In any case, my position is that practices can and should be understood as designs, because 1) they show characteristics common to designs; 2) they have similar origins as other designs; 3) practices are the most significant arena where everyday life design by each of us takes place; and 4) it helps us to understand better how everyday life comes to be and what kind of complex co-creation activities and relationships these processes include.

Practice is a very worthwhile concept that helps us to understand better what people do and why, and why they do it in some particular way, and what are the roles of the artifacts that are employed within the practice.

Practices and artifacts have a tight relationship: artifacts have no role in life outside of practices. Every artifact comes into contact with people and used through their practices. An artifact that is not part of a practice of a person does not have any connection to the person. Practices also join artifacts to



the purposes, aims, motivations and thinking of their users (Schatzki 2002).

By considering the emergence of practices both as social and individual phenomena as a design process with intentional and emergent features helps us to get a better picture of the evolution and emergence of practices and thus also of the way how the roles of artifacts evolve in everyday life.

Practices are both learned and imitated from others, as well as developed by individuals. Practices have an *individual* and a *social* dimension. Practices are social when they are shared with others, but when an individual participates in the shared social practice, she must by necessity perform an individual version of that practice, as no two people can possibly perform any practice exactly the same way. Thus, the development of the ability to perform and thus reproduce the practice individually is a prerequisite for the individual to be able to participate in the social practice at all. In addition to the repertoire of social practices, people also develop their own individual practices that may or may not be socially shared, or are shared to a greater or lesser extent.

*Social innovation* is largely about the *spreading of novel practices among some communities*. This may happen so that individuals develop various protopractices that are imitated and further developed by others, and through both intentional design and evolutionary emergence, some forms of the practice, supported by appropriate artifactual design, emerge as new social practices that count as social innovations.

Among individual practices, there are probably large numbers of practices that are in diverse forms many times reinvented by disconnected individuals and that do not persist as social practices in their communities, and may never be even seen by others.

The so called *lead users* (Eric von Hippel 2005) are people who have strong special interests to develop new practices as well as influence the development of the artifacts that can support those practices. In the same vein, *if we are able to develop our sensitivity to the evolution of individual and social practices that takes place in society, also when we can not clearly find appropriate "lead users", we can maybe identify promising opportunities for new artifact or service designs to better support the novel emerging forms of practices.*

## DEFINING THE DESIGN ECOSYSTEM

Based on the concepts introduced above, *design ecosystem* is a new term I introduce to describe the conceptualization of a topic of interest together with the context where the topic of interest exists or happens. A *design*

*ecosystem is a unique, specific and particular set of interacting and connected designs. The designs to be included in the consideration can be for example artifacts, practices, people, networks, organizations and communities. The components of the ecosystem typically have a diversity of dependencies, connections and flows between them. The most important components that organize design ecosystems are typically the practices of their human participants.*

As the design ecosystem is an instrument of study, the knowledge interest of its user will need to determine how the boundaries of the study will be determined.

For example, if we want to study everyday life of an individual, the design ecosystem of everyday life is a system that consists of the various designs that the individual interacts with, with all their dependencies and connections. We can select a narrower topic, for example an individual's kitchen or cooking ecosystem, or an individual's media ecosystem, and include in this design ecosystem those components that are relevant to this topic of interest. When studying a design ecosystem with a tighter focus such as "cooking" or "media", it appears as unnecessary highlighting to keep repeating the word "design" if it becomes clear from the treatment that a kind of design ecosystem is being discussed.

The topic of interest could also be tied to some other kind of entity – we could study the design ecosystem of a group of people or an enterprise.

## WHY IS THE DESIGN ECOSYSTEM A USEFUL CONCEPT?

The design ecosystem is an intellectual instrument for studying things and the activities they belong to together in a way that, through the inclusion of practices as the designs that organize the ecosystem, also opens up the reasons for their connections and dependencies as well as the motivations, purposes and intentions of the people involved.

If we consider the everyday life of an individual, it is a continuum that evolves continuously throughout the individual's lifecycle, from birth to death. When a child is born, she is born into a design ecosystem, established by her parents. Gradually she develops her own capacity to form and evolve her own design ecosystem.

The design ecosystem is in itself a complex design that evolves as a mix of intentional, externally imposed and emergent changes. Generally people strive to maintain continuity within their ecosystem, in order to be able to sustain important practices and avoid wasting work and design efforts, and to be able to direct their efforts to activities according to their own priorities. As part of such strategies, people acquire and furnish homes that

support their own lifestyles with appropriate selections of artifacts and other resources. When new practices or new artifacts enter the ecosystem, their inclusion requires changes and adaptations. As components of the ecosystem have various dependencies, it is sometimes complicated to replace existing components with new ones, as their features and interfaces to other components may not be exactly similar.

The importance of understanding such dependencies and systemic connections between components has grown dramatically because of digitalization. *Digital components have a dual nature as flexible and rigid at the same time*, due to their digital programmability. Because they can be programmed, they can in theory be designed to be *extremely flexible and infinitely customizable*. However, as their functionality depends on very strict conformance to a linguistic grammar and their programmable *flexibility depends on the ingenuity of the software designers to express the intended flexible ideas in strict conformance with the available software platform* (e.g. a specific version of a specific operating system), they are also tied very rigidly to *design rules* established by their design ecosystem.

Digital components are thus much more deeply and dependently connected to each other than non-digital ones, and their ability to deliver their expected services depend significantly on their ability to communicate and work with other components in the ecosystem.

These dependencies are also a significant source of power for those parties who are in a position to decide about the designs of those components that function as the enabling gatekeepers for other designs: the *design platforms*, e.g. operating systems (Windows, OS X, iOS, Android) and key internet services such as Google search, Google Maps, Amazon, and Facebook. Platform owners may have the power to decide alone dictatorially which features, which services, or even which partners they support and allow to contribute to the customer's design ecosystem. For more about platforms in general, see Gawer (2009).

## DESIGN TOOLKIT AND DESIGN SPACE

When someone engages in design, their ability to design depends heavily on what earlier designs they have available to them as raw materials for their design. The more sophisticated, capable and useful designs they can build on, the more sophisticated their own designs can be. Such existing designs in any design situation form the *design toolkit* for further design. The concept of design toolkit is in widespread use, but here I claim that it is useful to consider that *every design situation always relies on a specific*

*design toolkit*, and that its characteristics can be analyzed to gain a better understanding of the design situation.

When someone engages in design, *the abstract, theoretical space of possible design outcomes that are possible to achieve, forms the design space* in that particular situation. The design space can change, extend or contract by introduction of new designs into the design toolkit, by their removal, by the introduction of constraints or freedoms, or the addition or removal of resources or capabilities (Botero, Kommonen, and Marttila 2010).

In the context of everyday life, *the central design activity of individuals is the design and adaptation of daily practices to changing circumstances, as well as the longer term design of various life projects* (Shove, Watson, Hand, and Ingram 2007). In these activities, *their design ecosystem effectively forms their design toolkit, and at the same time largely determines their design space*. Certain individual components of the design ecosystem, e.g. *the design platforms, have much significance in determining the qualities of the design toolkit and the design space*.

## DESIGN ECOSYSTEMS AS LANDSCAPES FOR CO-CREATION

The discussion of design in the beginning of this paper can now be connected to the topic of co-creation. When we are discussing something like the creation of consumer products or services, it appears from the point of view of an individual as an offering to extend their design ecosystem with a new component. In order for them to include it in their ecosystem they will need to always make space for it and adapt their ecosystem to connect to the new offering. Hence the acceptance of an offering always entails also a reciprocal act of adaptation and thus, design.

If I decide to have a dinner in a new restaurant or to buy a new mobile phone app, these offerings will not become part of my life without some kind of adaptation of my practices. Hence even the smallest change requires some kind of a creation effort from my part. How much, and how convenient and how motivating this is for me, depends on the compatibility of the offering with my unique and idiosyncratic design ecosystem. If the offering is more complicated, for example something where more significant design is meaningful, the importance of compatibility and avoidance of wasting earlier design effort and redoing of work increases.

Thus, the design ecosystem of an individual forms a unique landscape where her creative actions always take place, and where the makers of the offering have to tread carefully and avoid disrupting existing designs,

couplings and practices, and instead find ways to support and strengthen the sustainable and fruitful evolution of the ecosystem and its resources.

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# Co-design and Value Co-creation - Implications from Service-Dominant Logic

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## ABSTRACT

*Collaborative innovation of new products and services has gained popularity, because it is argued to help companies to produce better solutions that match customer needs. However, this is a very firm-centric view to the phenomenon. In this paper we present three web-based co-design studies and discuss the relationship between co-design and value co-creation as implied by service-dominant (S-D) logic. Usually, co-design of services refers to the time before a service launch, where different stakeholders (especially users) are involved in the innovation activities. Value co-creation on the other hand is a broader concept that might include also the above mentioned phase, but that mainly refers to the time during use of a solution and its integration to other resources in order to create value. In the results we discuss how the current co-design methods could be developed in order to understand value co-creation at large.*

## KEYWORDS

*co-design, value co-creation, service-dominant logic, research design*

## INTRODUCTION

Involving users and customers in the innovation and design processes of companies has increased in the past years, and a lot of research has been published under the topics of open innovation (Chesbrough 2003), user innovation (von Hippel 2005) and co-creation (Prahalad and Ramaswamy 2004). Collaborative innovation in general has been studied from various perspectives, such as marketing, innovation, design and human-computer interaction, which has resulted with a variety of concepts related to the same phenomenon as well as same concepts referring to different issues (Koskela-Huotari et al. 2013).

We have conducted over sixty co-design projects in an online platform Owela in which companies and end users jointly innovate new products and services. In this paper, we examine how our studies can be interpreted when examined from the perspective of service-dominant (S-D) logic (see e.g. Vargo and Lusch 2004; 2008; 2011).

S-D logic is an emerging logic that abandons the company and product-centric goods-dominant (G-D) paradigm and brings the service beneficiary (e.g. customer) as an endogenous participant in the process of value co-creation. In S-D logic the central notion is that *service*, defined as the application of competences (such as knowledge and skills) for the benefit of another, is the basis of exchange (Vargo and Lusch 2004). This notion gives a fresh perspective for understanding economic phenomena, by implying that value is created collaboratively in interactive configurations of mutual exchange (Vargo, Maglio and Akaka 2008).

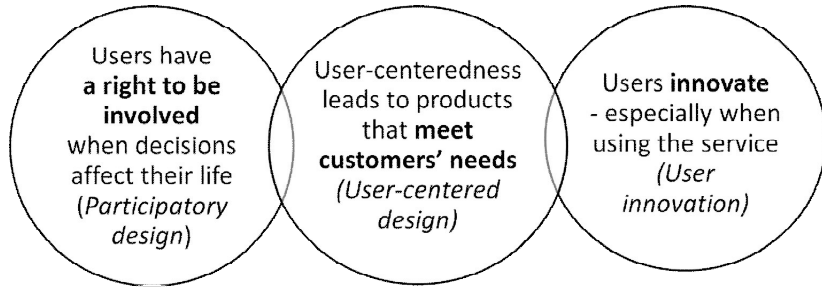
Our aim is to draw from our previous experiences of conducting collaborative innovation projects on the online platform and to discuss how a service-dominant worldview could influence on the way we do research and conduct our studies.

## THEORETICAL BACKGROUND

Co-design and co-creation are sometimes used confusingly as synonyms and both of the concepts have also been given various meanings, depending on the field of research (Koskela-Huotari et al. 2013). In this chapter we present a brief background of their origins in different research streams.

### **Research streams related to co-design**

Co-design refers to the process and tools that enable the collaborative engagement of actors (designers and non-designers) in different roles during a design process of a company offering (Sanders and Stappers 2008, Mattelmäki and Sleeswijk Visser 2011). One essential aspect in co-design is the involvement of end users, which has been studied from several viewpoints. In this paper we concentrate on user-centered design, participatory design and user innovation discussions. Their main claims are presented in Figure 1.



**Figure 1. Justifications for user involvement in design processes**

User-centered design (UCD) aims at usability of interactive systems. The basic idea is that when users are taken into the focus of the system development process, the resulting products are easier to use and meet the users' needs better. UCD process provides methods for understanding users' activities and the physical and social context of use as well as for evaluating the design solutions iteratively with potential users (Gulliksen et al. 2003). Typically, professional designers and developers lead the process, collect the user data, analyze it, and make design decisions based on the data. Users are involved in the process, but only when the professionals need their input.

Participatory design (PD) is a related approach that originates from the information system design at workplaces. It is based on the ideology of democracy and states that the workers have a right to be involved in the decision-making affecting their daily (working) lives (Muller and Kuhn 1993). In PD, users participate not only as information sources or evaluators but as active design partners. Users and developers collaborate in a shared space where they can learn from each other (Greenbaum and Kyng 1991). Typical methods include design workshops, scenarios, mock-ups, prototyping, and user testing.

Co-design is based on the same principles than PD but co-design has been applied in more varying design contexts (not only workplaces), it focuses on the creative collaboration and ideation with users, and is closer to business thinking (Sanders and Stappers 2008). Typically, in the co-design process, designers are not anymore "user researchers" but facilitators of the design process who help the users to find solutions to their needs. In that sense co-design comes close to the user innovation approach, which states that the users are capable to innovate themselves. Users innovate especially during the use when they realize, how the solutions could be developed further. The producer's role remains to provide customers with tools that enable them to create the service innovation themselves (Thomke and von Hippel 2002).

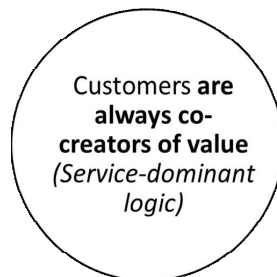


The research streams relating to co-design highlight the importance of the user and point out that companies should pay more attention to their customers/users of their offering and involve them into the innovation process. However, they often still reflect the company-centric worldview as it is the company, who owns and defines the development process. It produces the products or services to the customers, who are involved in those phases of the development that the company finds useful for itself.

### **Research streams related to co-creation of value**

Co-creation of value has become a key concept in understanding the general logic of exchange and business in the marketing and management research (Saarijärvi et al. 2013). One of the research streams contributing extensively on value co-creation discussion is service-dominant (S-D) logic. Value co-creation is a central concept also in other service research streams and discussions such as (critical) service logic (Grönroos 2011) and customer-dominant logic (Heinonen et al. 2010). These discussions have a lot in common, but they do differ for example in how they see the scope of value co-creation. In this paper we will concentrate on S-D logic and its implications.

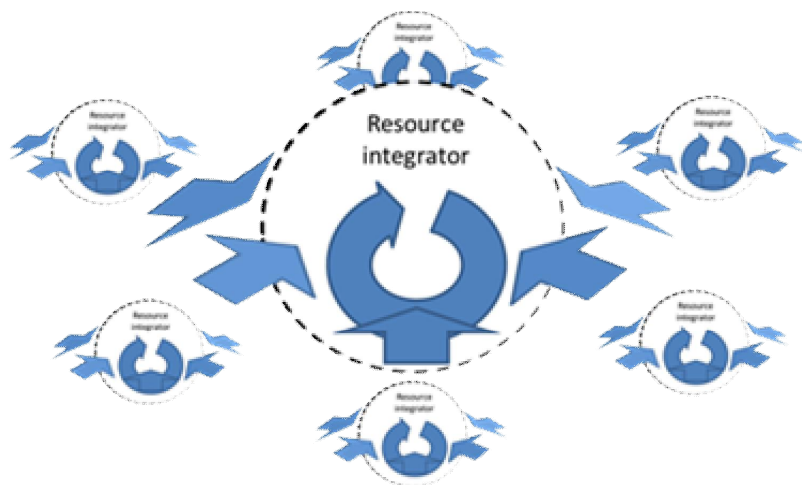
According to the S-D logic, value is manifested in the context of the service beneficiary such as customer (Lusch et al. 2008) and therefore customer is always a co-creator of value (Vargo and Lusch 2008). In S-D perspective value co-creation is built on service provision and the contextual nature of value suggests that what companies provide should not be understood in terms of outputs with value, but rather as inputs and resources for customer's value creation process rather than on production of tangible and intangible outputs (Vargo and Akaka 2012). Hence value is not seen as something that can be embedded in e.g. products. Instead, it manifests itself over time through use (Vargo 2009).



**Figure 2. Customers' role in the service-dominant logic**

As value emerges and unfolds over extended periods of time, it is not tied to the discrete, production-consumption events (Vargo 2009). It unfolds as

new resources from multiple sources are combined with each other in the context of an individual's life. This implies the relational nature of value as the activities of all parties interactively and interdependently combine, over time, to create value. Therefore the more recent development in S-D logic has led to the introduction of the service-ecosystems perspective (Vargo and Lusch 2011). This view underlines the complex and dynamic nature of the social systems through which service is provided, resources are integrated and value is co-created (Vargo and Akaka 2012). It urges us to abandon the producer and consumer/user division and to see all parties as resource integrating actors with the common purpose for co-creating value for themselves and others (Vargo and Lusch 2011), as illustrated in Figure 3. Hence, instead of one-party centrality, such as customer or company centrality, it urges balanced centrality (Gummesson 2008)



**Figure 3. All actors are resource integrators**

S-D logic distinguishes between co-production (collaborative creation of a company's offering) and value co-creation (all encompassing, complex and dynamic process in which actor-determined value-in-context is created). Of these two processes the latter is seen as superordinate to the former (Vargo 2008). In S-D logic co-production is seen as a component of co-creation of value (Vargo and Lusch 2008), which represents the joint activities of the firm and the customer (or other actors) in the creation of the firm output (Vargo 2008). It can occur through shared innovativeness, co-design or shared production of related products and it can occur with any parties in the value network (Lusch and Vargo 2006). While in co-production customer involvement is optional, in value co-creation it is unavoidable as there is no value co-creation without a beneficiary (e.g. a customer) determining the value. In value co-creation each actor is seen as its own

primary resource integrator, using the application of its uniquely configured resources as the currency for service-for-service exchange in order to acquire resources from other actors. Hence, all actors in value co-creation can be seen as resource integrators that differ based on available resources and their unique configurations.

## CASE STUDIES

With the help of three previous co-design studies, we will discuss the implications of S-D logic on the way we conduct research. All the co-design studies were conducted in Owela (Open Web Lab), which is an online platform designed for collaborative innovation activities (Friedrich 2013). Owela provides tools for online focus groups where users and different stakeholders can discuss, ideate and design new solutions together. Owela tools include blogging (posting, rating and commenting), chat, questionnaires and polls that can be tailored for specific design needs. The summary of the selected case studies is presented in Table 2.

**Table 1. Co-design studies**

Case study	Goal	Scope	Year and length	Participants
Mobideas	To ideate and develop a new social media service with users	From ideas to prototype	2009-2010, 6 months	33 users 4 developers 2 facilitators
Monimos	To design a service supporting immigrants' civic participation	From user needs to the launch of a service	2009-2010, 10 months	30 users 1 developer 1 designer 6 researchers
MyContent	To understand the meaning and use of digital content and collect people's experiences in use	From people's contexts and practices to experienced value-in-use	2012, 2 months	60 users 2 company representatives 2 facilitators

### Mobideas

The aim of the Mobideas study was to develop mobile social media services within an agile software development process (Näkki and Koskela-Huotari 2012). The Owela workspace was used as the main tool for communication and collaboration between users, software developers and researchers who facilitated the process. 33 users participated as active innovators and co-designers during the whole development process from needs recognition and idea generation to prototype testing.

The process was initiated by the researchers and a company providing mobile platforms, who was interested in getting new demonstrations of mobile social media services on their platform. The software developers

were students that participated in the project as a part of their studies. However, the users were the initiators of the new service ideas and they were given real decision-making power.

The project started with collecting stories about users' everyday with mobile phones in a shared blog. Based on the needs and challenges with the current solutions, users generated ideas for new services both individually and together in moderated chat sessions. The facilitators, company representatives and software developers selected five service concepts of which the users could choose their favourite ones. The most popular concept was implemented iteratively, so that the users could continuously suggest new features and evaluate the prototype in a beta test. The process resulted with a prototype of a social map, which was never developed further or launched to the market.

### **Monimos**

The aim of the Monimos study was to develop social media tools for immigrants and multicultural associations in the Helsinki metropolitan area (Bäck et al. 2013). The initial service ideas were developed in expert interviews, workshops and public online discussion in Owela. The chosen service concept was then developed further by a core team that consisted of ten immigrants and two employees of a multicultural network, a web developer, a designer, and six researchers of different fields. The core team held monthly face-to-face workshops and communicated online in Owela between the meetings.

In the early workshops, the focus was on idea generation, use scenarios and use case descriptions, whereas later workshops concentrated on evaluating the Monimos website that was iteratively developed throughout the development process based on participants' feedback. Co-design methods included brainstorming, use scenarios and user story writing. Owela workspace was used between the workshops and was open to anyone. In Owela, people were able to make suggestions regarding the service concept, features, layout and name of the service, and to discuss and vote on these.

The process resulted with a social networking site for international associations. The multicultural network that participated in the project took the ownership of the service and continued its development and administration.

### **MyContent**

The aim of the MyContent study was to understand the meaning of digital content to people and find out how it is used by collecting participants' perceptions of sharing and storing digital content in a form of narratives.

We used the event-based narrative inquiry technique (Helkkula and Pihlström 2010), but applied it by collecting text-based stories over via the Internet. In the first phase of the study the aim was to understand the phenomenon without a predetermined solution and collect stories based on the real life experiences of the participating persons. Hence, the collected stories reflected the whole spectrum of possible solutions and practices related to e.g. digital photo sharing. They also revealed the close interplay between digital and physical content.

During the last six weeks of the study the participants used a beta version of a cloud-based solution designed for storing and sharing digital content. In Owela, they described their experiences in a continuous dialogue with each other and the employees of the solution provider. In addition to the eight week long Owela discussion, three voluntary face-to-face focus groups were held for the same participants.

The study resulted with several insights about how the company's solution fit into the lives of the people using it and how better integration could be supported. By understanding the practices related to storing and sharing of content new possibilities for innovative solutions were revealed.

## DISCUSSION

In this chapter, we draw from our previous experiences of conducting collaborative innovation projects on an online platform and discuss how S-D logic could influence on the way we do research and conduct our studies.

### **Nature of value calls for longitudinal studies and narrative approaches**

As value unfolds over a long period of time (Vargo 2008), longitudinal research is needed. The design process and launch of a service is only the starting point for value co-creation. If we want to understand value we need to understand how it unfolds through use as was done in the MyContent study to some extent. This implies an iterative process for innovating new solutions.

Experiential and contextual nature of value suggested by the S-D logic (Vargo and Lusch 2008) points towards the need of narrative methods such as EBNIT (Helkkula and Pihlström 2010) that enables people to reflect on the possible meaning of the experiences and to construct meaning together. This approaches was already implemented to some extent in the MyContent study, however, it could have been taken even further. The benefit of online platform such as Owela over e.g. individual interviews is

that it allows participants to engage in shared story-telling. Everybody has the chance to comment and share their related stories and collectively construct meaning.

As the experienced value is always determined separately by each actor, the research should start from the individual participants' goals and not only from e.g. company's goals. In our case studies, the expected value of the outcome for the participants was never explicitly defined collectively. Different participants thus had varying aims, expectations and experiences of the design projects, and "users'" aims differed from the ones that the "company members" or "researchers" had stated for the project. For example, in the Monimos project one participant wanted primarily to create networks with the other immigrants living in the city. The actual outcome was not her main reason to contribute. In the Mobideas project, someone wanted to learn more about social media and another one wanted to share his ideas – regardless if there was a real need for them or not.

The participants evaluated the success of the co-design projects based on their own gains. Even if not all of them were satisfied with the service developed, they mentioned other benefits that made the participation valuable for them. Someone learnt new methods for collaborative work, someone got information of new social media services, someone networked with other interesting people and one Monimos team member even founded a company inspired by the discussions on the online service that was developed in the project. The online service never became widely used, but the few active discussions in the beginning integral input for the participants' value co-creation processes. In other words, a single co-design project can serve as an input for several overlapping and intertwined value co-creation processes. This is important to note from motivation's point of view when planning a co-design study.

### **Service ecosystem perspective implies a shift from roles to resources**

Due to reciprocal nature of value co-creation, it is important to note that in order to create successful solutions one needs to increase the viability of the whole (service) ecosystem (Vargo and Lusch 2011) and not just to optimize single actor's benefit. Hence, the focus in our studies should shift from involving only "users" and a "single company" in collaborative innovation activities to involving the whole service ecosystem included in the value co-creation process. This of course requires a large variety of different kinds of methods for participation.

In our case studies, we had predefined the participants into the roles of users and companies. However, the participants had in reality many different roles. Some of the “users” worked as software developers, designers or consultants whose own work was also related to the service under development. According to S-D logic, there is no need to differentiate between company and customers. There are only actors with different resources. In the co-design projects, we could also define the participants e.g. based on their capabilities and skills, previous experience on the topic at hand, personal networks and interests.

In the future co-design processes, the participants could choose their role themselves, and contribute in those phases of the project on the tasks that they are most interested in and what they can easily do. The rewards should also be shared so that not everyone is expected to do the same or be active all the time. The resources of all participants could be visualized to everyone so that people would also need, with whom they could collaborate.

All the actors in a service ecosystem involved in value co-creation have both the role of service provider and service beneficiary. Though for some actors this dual role is masked in a form of indirect service exchange such as providing money in return of service. In comparison to the traditional UCD and PD approaches, this implies a need to understand actors’ resources also in their role as service providers (not only as service beneficiaries).

## CONCLUSIONS

In this paper we have discussed about the initial implications of S-D logic and the concept of value co-creation on the collaborative innovation activities and co-design studies we have conducted. In summary, to move from mere co-design of a solution to understand all encompassing nature of value co-creation as implied by the S-D logic, requires several changes on the scope and focus of the research. A lot more research is needed in order to gain a comprehensive view on what the S-D logic worldview truly means for the way empirical research is conducted.

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# Principles of Innovation Processes in the Hospitality Industry

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## ABSTRACT

*This paper explores the status of innovation in the hospitality industry, based on a literature study and field observations on recent developments, and argues the need for further research, especially with respect to open innovation.*

*The hospitality industry shows little innovation initiatives in response to current economic hardships and the increasing complexity of society and responses are mostly initiated by third parties.*

*Cooperation in open-innovation networks seems to fit the services industry though, since a large part of the operational side is in direct contact with guests, and it is also likely that participative guest behaviour leads to innovations. As the innovation potential of the hospitality industry seems to be supportive to open innovation systems, it can be concluded that future research into this potential can shed a light on drivers and obstacles for open innovation and their affiliation with characteristics of the hospitality industry.*

*The results of this study will serve as the basis for a PhD research, aiming to build a testable theory of forms of (open) innovation in the hospitality sector, and the factors promoting and inhibiting these. For this research a case study will be designed in order to observe the innovation processes within Hilton Worldwide.*

## KEYWORDS

*Open Innovation, Hospitality, Services Innovation, Literature Review*

## THE HOSPITALITY INDUSTRY

The hospitality industry faces a future of challenging developments. Like other service-based industries, hotels experience fundamental economic and societal changes and make an effort to respond to them appropriately. The financial crisis of 2008 triggered a strong competition on the basis of room prices. In Amsterdam in 2009 many five star hotels were offering hotel rooms for three star rates. Some five star hotels, like Sheraton

Amsterdam Airport en NH Amsterdam Centre, continued their business as four star hotels (Hosta report 2009). Revenue per available room in Amsterdam went down 17.5 % in 2008, the sharpest dip since 1993. The situation in Amsterdam seems to represent the standard response of hotels to an economic downturn, as the industry still shows a strong emphasis on cutting costs and lowering prices.

Whereas the economic crisis is temporary, there are also other, more fundamental issues. A survey by IBM amongst 1500 CEO's worldwide (Berman 2010) indicates that increasing complexity is perceived by the interviewees to be the most challenging factor in the near future. As a result, 60% of the respondents state that creativity is the most important quality for a manager in order to respond to this challenge. In the hospitality industry more specifically, important developments that call for creative answers are the vastly increased transparency due to the internet and changing preferences and expectations of clients (Chen 2011).

Some responses in the sector are noteworthy. Hospitality concepts like Seats2Meet, initiated in the Netherlands, offering flexible workplaces, give an example of the opportunities for the hospitality industry to adapt its business model to in order to respond to the changing circumstances in society (Drion et al. 2009). The hotel sector also shows developments towards further industrialization of its offerings, like the CitizenM concept based on prefab hotel rooms, towards new use of real estate as demonstrated by variations on pod-concepts like Q-bic and Yotel, and towards crowd sourcing hospitality concepts like CouchSurfing ([www.couchsurfing.org](http://www.couchsurfing.org)) and Airbnb ([www.airbnb.com](http://www.airbnb.com)). Still, those developments are mostly initiated by third parties (Martínez-Ros and Orfila-Sintes 2009) and seem to have only little effect on the main players in the industry (Marée 2011).

The strong forces of the standard responses persist in the hospitality industry, as is also reflected in the continued prevalence in the hospitality industry of success indicators that are in essence related to the numbers of stays of guests. Important data in annual reports are related to ADR (Average Daily Rate), REVPAR (Revenue Per Available Room) and Occupancy Rates. The almost exclusive attention to these indicators suggests that new hospitality business challenges are not yet incorporated in the vocabulary of the business today. New approaches to innovation (Inauen and Schenker-Wicki 2011), that offer opportunities to deal with and profit from the increasing transparency of the market and changing client expectations, seem necessary.

## INNOVATION

The phenomenon of innovation is being referred to in a large variety of contexts. In their definition literature overview on innovation, Garcia and Calantone (2002) prefer the 1991 OECD definition: “Innovation’ is an iterative process initiated by the perception of a new market and/or new service opportunity for a technology based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention.” (Carcia and Calantone 2002, p. 112).

As described by many, the discriminating dimensions of innovation are *newness* of the product, service or process (be it incremental or radical or somewhere in between), the *value* of the innovation (as perceived by different stakeholders, which might lead to conflicting interpretations of the value) and the fact that it is *implemented* (De Brentani 2001; Tidd and Bessant 2009). As such, innovation is the implementation of results of creativity and aspects of creativity need to be taken into account in the process (Alves et al. 2007). The fact that participating in a creative process has a value of its own for the participant sheds an important light on the potential of the facilitation of participation in so-called Open Innovation (Grönroos 2008).

## OPEN INNOVATION

Henry Chesbrough (2003) propagated the logic of cooperating across the boundaries of the organization in order to innovate in what he defines as today’s “distributed landscape of knowledge”. He introduced the phenomenon of ‘open-innovation’ as an answer to the increasing transparency of society. It comprises the innovation processes that cross organizational boundaries, both inside out and outside in. Analogue to open innovation is the concept of ‘co-creation’ (Prahalad and Ramaswamy 2004) where the involvement of customers, or guests, is an important aspect within value networks. Finally, the rise of the so-called ‘prosumer’, as originally coined by Alvin Toffler (1980) based on the blurring of producer and consumer as observed by him in the case of the introduction of the do-it-yourself pregnancy test kits in the seventies of the last century, is now actually taking shape.

Open innovation in the services industry requires a specific approach, as explored by Chesbrough (2011). He observes a lack of in-depth research on services innovation and urges to

“stimulate much greater research activity in the university sector towards services innovation.”

(Chesbrough 2011, p. 192). The need for further research on the topic is also explicitly expressed in relation to understanding group creativity (Sawyer, 2012) and with regard to the hospitality sector (De Brentani 1991; Ottenbacher 2005, 2007; Orfila-Sintes and Mattsson 2009). Cooperation in open-innovation networks with stakeholders, amongst whom also the hotel guests, is called for (Grönroos 2008; Ordanini and Parasuraman 2011; Williams and Shaw 2011) but is still rarely practised in the hospitality industry.

And yet, the services industry and the hospitality field in particular seem to be apt for the use of open innovation. The fact that a large part of the operational side is in close touch with the client stimulates the occurrence of ‘Silent Design’, a process that is implicitly accepted and utilized in the services industry (Gorb and Dumas 1987; Voss and Zomerdijs 2007). This improvement process is carried out by individuals, not considered designers, in the operational departments. It prevents organizations from losing touch with reality. Direct involvement in creation also induces meaningfulness for both employees, guests and other stakeholders as a result of the process, in particular in the hotel environment (Grönroos 2008, Goldstein et al. 2008; Melissen and Marée 2009; Pink 2011). The challenge is to manage the process in such a way that the initial improvements are being utilized.

Facilitating a collaborative multidisciplinary environment, i.e. an environment where firms and science and technology institutions coexist and cooperate, would be beneficial to the innovation process (Dougherty 2004; Alves et al. 2007; Hu et al. 2009; Martínez-Ros and Orfila-Sintes 2012). And another benefit; open innovation can be seen as a means to prevent the ‘Not Invented Here Syndrome’ (Huizingh 2011). From that perspective it can be valuable to focus on learning processes within and outside the organization, in relation to innovation. As suggested by Sawyer (2007) one of the five key features of collaborative webs (a diffuse and informal network of dedicated participating people) is that no one company can *own* such a web. Still, the strong connection of the guest to the social context offered by the hotel (Goldstein et al. 2008) makes it likely that participative guest behavior is prone to lead to innovations, especially since there are so many of them (Surowiecki 2004). In this light it is worth mentioning that much of the innovation in the hospitality industry is still initiated by the suppliers (Hjalager 2002). And, although a common understanding of the service industries and the hospitality industry in

particular puts the role of employees in a central position, be it as the main influence on the quality of the delivered service (Ottenbacher and Gnoth 2005; Ottenbacher 2007) or as an important driver for change and innovation (Voss and Zomerdijk 2007), the tendency of smart (IT-) processes distancing or even eliminating employees from the service process -as can be seen in hotel concepts like citizenM- needs to be taken into account. All these developments are of paramount importance to the hospitality industry.

Within this context it is interesting to refer to a study by The Hague Centre for Strategic Studies and TNO on the current status of innovation in the Netherlands (Van der Zee et al. 2012). Amongst others it describes the importance of a better understanding of open innovation processes. Open innovation is seen as one of the options to break through the Innovation Paradox, the phenomenon that investing in only science and research does not lead to sufficient successful innovations. They state the Dutch economy should especially focus on the interaction and cooperation between various producing industries and the service sector, to fully use its strength (Van der Zee et al. 2012).

## DEVELOPMENTS IN THE INDUSTRY

As the focus of this study lies on what is going on in the hospitality industry in the light of cooperative and transparent innovation processes, it is key to keep track of the most recent developments in this industry. These observations can therefore not yet been found in academic literature and consequently main sources are newsletters and press-releases. As these developments seem to indicate a tendency towards the use of open innovation, a non-comprehensive sketch of these developments has been included in this article.

Cooperation between parties in order to reach higher levels of creativity and understanding becomes a factor in the hospitality industry. Co-creation and collective learning processes are supported in several organizations (Hu et al. 2009). The Marriott owned Ritz Carlton chain promotes for that reason to actively stimulate the participation in “Lateral Service”, (Michelli 2008) in which staff members also participate in activities that are not implicitly part of their job description. Ritz Carlton aims for spontaneous cross-training, for less isolated departments and for an unprompted increase of empathy for other functions of employees. Many large hotel chains have developed internal learning programs and processes that stimulate involvement of their staff in improvement of products and services. Hilton

Worldwide developed its Hilton Worldwide Corporate University (HWCU), which evolved in a little over ten years from 80 to around 2500 courses (International Youth Foundation 2013). These initiatives indicate that those organizations expect a positive effect of learning and experimenting together, and changed their processes over the last years accordingly.

In recent years several large hotel chains also show some change of strategy by initiating new hotel concepts while using input from *outside* parties like potential future guests. Examples are two new brands; *Aloft* (Starwood) and *Even* (InterContinental Hotels Group; IHG). When the basics of the Aloft concept were ready, Starwood opened the first pilot hotel on September 2006 in an avatar-world on internet: SecondLife (Kohler et al. 2009). Only a year later the first real-life hotel was opened in Rancho Cucamonga CA, partly adapted to the criticism, received from visitors of the Second-life hotel. IHG initiated Even Hotels in 2012. With a press release on February 28 (Gullet and Soffer 2012), the group announced the start of the new concept and via the website invited everybody who felt interested to participate in a community they would use to frequently ask about preferences in hotel stays. This process is still on-going, at least until the planned opening of the first hotel in 2014.

Recently Center Parcs Europe, a large provider of short break holiday stays in Europe, initiated a design process of its new brochure in cooperation with its guests. Based on the slogan “Center Parcs, let’s get closer” (Lindhout and Wijnen 2012), they announced that the result has become more authentic and closer to the real guest experience.

The previously mentioned concept of Seats2Meet offers facilities to other parties to encounter in a work environment that supports open processes, cross linking and serendipity (Olma 2012).

Hospitality related parties also focus on the benefits of co-creation. Review sharing sites like TripAdvisor are used worldwide and a continuous topic of discussion. Another form of co-creation can recently be found in an app like HotelTonight that offers guests the option to share their experiences by uploading pictures via the app and get paid for the result.

## DISCUSSION AND FUTURE RESEARCH

Despite the recent developments as described above, the hospitality industry has been fairly slow to respond to the challenges, and responses so far have been limited. This raises questions on the processes of innovation in this sector (Hjalager 2010; Liburd and Hjalager 2010; Camisón and Monfort-Mir 2012). As the risk of failure is always present in innovation

processes, the risk-avoidance within the industry could be of influence (Panne et al. 2003; Martínez-Ros and Orfila-Sintes 2009).

Ortt and Van der Duin (2008) indicate that with the emerging innovation-in-alliances (a process, equivalent to open innovation) since the 1990s, a need for 'Contextual Innovation' rises. In order to make use of the right type of innovation, management has to be able to respond to several contextual factors with sometimes paradoxical effects on creativity (George 2007). Research into those factors has been based on the influence of, among others, the type of technological change, leadership, work-climate, and external contacts amongst employees on employees' innovative behaviour. To bring in the contextual approach to innovation management, Ortt and Van der Duin (2008) state, greater insight is needed into the specific *relationships* between these factors. In order to study this correctly, rather than a comparison of components per se, a combinational perspective should be used (Lee et al. 2004).

Hence, the main research questions of future research could focus on the drivers of and obstacles to open innovation in the hospitality industry. What are the opportunities for open innovation, including cooperation with other actors, including guests/customers? In which way does this cooperation influence the meaning of the interaction? What distinguishes firms that are more proactive in this respect from the rest of the industry? And how could other fields benefit from understanding characteristics of the hospitality field that support open innovation processes?

At present, little is still known about the factors promoting or inhibiting open innovation in the hospitality industry, therefore future research should be of an exploratory nature in order to build a testable theory of forms of open innovation in the hospitality, and the factors promoting and inhibiting these.

Such an inductive, theory-building study requires a systematic approach as well as privileged access to a research site (Gioia et al. 2012). For a scheduled study access is granted to Hilton Worldwide, a renowned and major hotel chain. Via participatory observation at various international development departments and through direct cooperation with the Hilton Worldwide Corporate University (HWCU), innovation processes within the Hilton organization will be studied and described. The HWCU provides for a global network of employees at all levels. This makes access to evaluation of processes related to new initiatives and initial development processes possible. It also creates opportunities to systematically observe internal processes.



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# The 'Openness Turn' in Co-design. From Usability, Sociability and Designability Towards Openness.

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## ABSTRACT

*Building upon both design research theory and practice, this paper explores the evolving field of co-design, and aims to interrogate some of the antecedent and contemporary understandings of the field found in the literature. We argue that these different understandings are mediated by a series of 'turns' we identify as: usability, sociability and designability. Moreover we illustrate how a fourth turn - the openness - is entering the stage. Finally, we introduce the concept of commons as a way of reflecting on the future of co-design.*

## KEYWORDS

*co-design, commons, openness, turns*

## INTRODUCTION

New technological possibilities for ordinary people to collaborate are enabling new ways of performing creative actions and participating in design and production. This challenges our way of thinking design and production, and affects the landscape of collaborative design research and practice.

Design research and related fields like HCI and Interaction design have broadened their locus from "human factors to human actors" (Bannon 1991). Also in the last decades "designers have been moving increasingly closer to the future users of what they design" (Sanders & Stappers 2008, p. 5). Building upon both design research theory and practice, this paper conceptualizes and critically explores the evolving practices of co-design, and interrogates some of the antecedent and contemporary understandings of the field. We argue that these different understandings are mediated by a series of 'turns'. We refer to them as: usability, sociability and designability

turns. Moreover we highlight how a fourth turn - the openness turn - is entering the stage. We adopt the concept of “turns” as a vehicle to communicate the developments, rather than discussing paradigm shifts, as we want to see these shifts as parallel and overlapping. Based on a review of literature and practice in areas that are shaping the discourse in co-design, we construct the four turns based on key differences relating to the *co* in co-design: distinctions relating to design outcomes, actors relationship between collaborators, and means and tools of collaboration. Finally, we introduce the concept of *commons* as a way of reflecting on the possibilities of participants in co-design endeavours to influence and negotiate issues like modes of governance and ownership.

In critically interrogating the *co* of co-design and advocating for an openness turn, we are drawing attention how open modalities of collaboration in contemporary culture are key in developing sustained collaborative and open design processes that will keep co-design relevant in the future.

The paper is structured as follows: We first briefly introduce the understanding of co-design we use in this paper. We then identify three turns that have shaped design practice and research and set the stage for the last turn we define as the openness turn. We sum up our findings though a summary table and finally discuss some implications of the openness turn.

## SITUATING THE CO IN CO-DESIGN

The relationship between the *co* in co-design and other *co*'s like co-creation is not simple or straightforward (see Sanders & Stappers 2008 and Mattelmäki & Visser 2011). In general terms we think it is useful to recognize that the concepts stem from different professional backgrounds and thus the vocabulary and focus of attention in research is somehow different.

Work on co-creation is for example derived mostly from the management and marketing studies perspective where the issue of how value is created and captured is at the centre of the inquiry (see e.g. Prahalad & Ramashwamy 2004). Work on ‘co-design’ on the contrary derive from disciplines associated with product/ technology design and development. In contrast to “co-creation’s” interest in value, the preoccupation in framing “co-design” has been at the level of the relationships between those “imagining” new products and those using them; put simply co-design is

interested in user-designer relationships (Voss et al. 2008). From that perspective co-design has come to mean a variety of things and activities.

Sometimes co-design is referred to as successful user involvement in concept design (Sanders & Stappers 2008). Other times the term has more connotations of a collaborative learning process between designers and practitioners (Suchman 1987; Ehn 1988; Greenbaum & Kyng 1991) and the creation of “in-between” spaces for collaboration between developers and users (Muller 2002). A widely quoted definition states that co-design is “collective creativity as it is applied across the whole span of a design process” (Sanders & Stappers 2008, p. 6).

In the remaining of the paper we will focus on the co-design aspects as they have been addressed in design research literature on digital media and technologies. In such settings co-design, besides methods and roles, can also be considered as the situated and collaborative expansion of the design spaces available to people (Botero et al. 2010). Here co-design does not refer just to a process, a space or a product but can also come to mean a collective developing of commons and culture. Thus when talking about co-design in this paper we refer both to design activities carried out by professional designers in a process with others, and to the collaborative design activities by groups of people together with experts and by themselves. We therefore argue for abandoning sharp distinctions between “use time” and “design time” (Fischer 2011), and acknowledge the relevance of co-design both in “use-before-use” and “design-after-design” (Redström 2008; Botero & Hyysalo 2013).

## URNS IN CO-DESIGN

As the previous section reviewed, various attempts at classifying the evolution of co-design have been made. Against this background we propose a framework for understanding co-design and its evolution in terms of a series of turns. We use the term evolution in a permissive way – combining it with turns to stress that each turn builds upon the previous ones, re-orienting the field without replacing completely what is already there. Combining evolution and turns has the advantage of implying a historicity of the field – that we find lacking in those frameworks that simply map different design research approaches – while avoiding the determinism of paradigm shifts.

The notion of a turn has been used to call for change – for turning away from something and towards something else. In his seminal book *The Semantic Turn: A new foundation for design* (2005), Klaus Krippendorff



argues that design needs to focus more on the semantics and value of artefacts rather than functions or intended use. He thus calls for a “turn” to semantics. Other researchers have called for other turns, like the “aesthetic turn” (see e.g. Udsen & Jørgensen 2005). We will not only be advocating for a new turn, but start by reviewing design research literature and practice to identify existing turns and explain their understandings of the *co* in co-design. Finally, we discuss the fourth emerging turn - openness - and advocate how it can build upon previous turns.

## Usability Turn

By the “usability turn” we refer to the practices of professional designers whose focus has a clear emphasis on use and use situations. This turn has provided impulse to the User Centred Design (UCD) movement and constitutes much of the basis of research and literature in the Human Computer Interaction field (HCI) (Grudin 1990, 2012), particularly the phases referred as 1st and 2nd wave of HCI (see e.g. Bødker 2006).

This turn is characterized by an interest in scientific measurement and evaluation of use and usability (see e.g. Dumas & Redish 1993; Human-Centred Design ISO-1999) deemed necessary when people other than trained technical professionals began to use computer systems (Kuutti 2009).

In the usability turn, defining and evaluating usability is addressed by a multidisciplinary team. The team invites specific users to inform and evaluate a product through e.g. a focus group or usability evaluation. Users are seen as achieving predefined tasks. Their role, when cooperating with designers and developers, is mainly to provide information – quantitative and qualitative - about the use and use context. Involvement of people can also be representational, meaning that use situations are being simulated by a professional in the design team, that represents the users and their needs. The focus is on how the product performs for the user (Norman 1988).

In the literature various methods and mechanisms to probe use and users are reported and evaluated (e.g. Sharp et al. 2007). Proponents of this turn have developed ways to communicate knowledge about users like e.g. *Personas* (Cooper 1999), communicate contexts of use and activities in the form *Scenarios* (Carroll 1995) and structured ways to document user actions such as *Task Analysis* (Hackos & Redish, 1998) that are then translated into design language (e.g. wireframes and user requirements). The usability turn provided standardized and efficient ways of dealing with

use and collaborating around it at design time, and has looked at, how users adapt or misuse designs after design time.

## **Sociability Turn**

What we refer to as the “sociability turn” encompasses efforts that explicitly recognise and address the social aspects of both design work and of use. Issues around the sociability turn can be recognized mostly in literature around the Participatory Design (PD) movement (e.g. Greenbaum & Kyng 1991; Simonsen & Robertson 2013) the Computer Supported Cooperative Work field (CSCW), and in the HCI literature dealing with third wave concerns (Bødker 2006).

The sociality turn is characterized by attention to the relationship between peoples’ practices and to facilitating stakeholders’ contributions (Ehn 2008; Redström 2008). It sees use in the context of situated actions (Suchman 1987), practices (drawing on e.g. Reckwitz 2002) and communities of practice (Lave & Wenger 1991). Here, users are a key part of the design process, rethinking and exploring existing designs and alternative futures through use. The methods of observing use and simulating use situations (e.g. Sanders et al. 2010) have drawn on ethnographic inquiries (e.g. Suchman 1987; Ehn 1988) to produce thick descriptions. Simulating use is also achieved via prototyping (Bødker & Grønbaek 1991), cultural and design probes (Mattelmäki 2006) and games (Brandt 2006).

The sociality turn literature sees design collaboration as enacted through organized events (e.g. workshops) initiated by experts and thinking of users as stakeholders that form partnerships (Sanders & Stappers 2008). Contributions however are usually situated in the ideation or conceptual design phase (Sanders & Stappers 2008; Botero & Hyysalo 2013). Although for contextual inquiries and for thick descriptions of practice, involvement of participants expands to include actual use time in situ (Botero & Hyysalo 2013).

It is important to note that the turn towards sociability aspects does not only refer to the inclusion of people in the design process or for the need to support cooperative actions. It also encompasses a new set of things to be designed. When focus shifted from more from human computer interaction to also to people interacting with each other via devices and networks, new areas of design emerged. Think for example of online participation platforms such as YouTube, Facebook, where new designs are needed to guide use (policies such as terms of use, copyright agreements) and participation (community guidelines, access management mechanisms), in

addition to foster cooperation (e.g. good practices) and creative actions by people.

Because sociality is multidimensional, the core design dimensions of this turn are then threefold: 1) Designing for participation in a design process or design space, 2) Designing for collaboration, that facilitates and supports collaboration and interactions between people in design, 3) Designing for sociability in changing socio-cultural settings.

## **Designability Turn**

In the third turn, “designability turn”, we move towards design work attentive to the design needs of contributors, even end-users themselves. Issues relevant to designability have been raised in the literature in PD (e.g. Harstwood 2002; Botero & Saad Sulonen 2010), design research in general (Krippendorff 2005), and in what has been lately called End-User Development (EUD) field (Lieberman et al. 2006).

The designability turn is characterized by advocacy for environments and systems where use is stimulated and triggered. Focusing on people’s design-after-design activities (Redström 2008) is at the core. An important goal is to design and develop during design time, environments and “systems” that are purposefully under-designed. One strategy is Meta-Design; the creation of social and technical infrastructures to enable novel forms of collaborative design and development (Fischer & Giaccardi 2004). Users are seen as potential designers extending, improving and appropriating designs. For that reason they need to be empowered “to act as designers” (Fischer & Giaccardi 2004), and provided with tools and support to do so (Hartswood et al. 2002). Facilitation takes place through flexible systems and services, tailored and developed further by their users, such as customizable applications, building blocks and software toolkits (Marttila et al. 2011). Similarly, as in the innovation literature that highlights the roles of so-called lead users who engage in design and development of products aided by toolkits, libraries and modules (von Hippel 2005).

Designability turn thus implies bridging participatory activities towards those of evolving life contexts (Fischer & Giaccardi 2004; Saad Sulonen et al. 2012) in the frame of ‘cultures of participation’ (Fischer 2011). From the professional designer’s point of view, the challenge of designability is to design resources that present a potential for designing, while supporting the process of a-synchronous adaptation and appropriation in real-time use.

## TOWARDS OPENNESS

The previous sections show that throughout the three turns in co-design there has been a drive towards opening the design activity to ever more open co-operation. The forth turn, what we refer as the “openness turn”, builds on this drive and extends it. In our attempt to define the openness turn, we both identify changes underway and argue for changes that we think can help harness and develop openness in co-design practices. The following treatment is therefore both descriptive of new practices emerging, and advocative in that it seeks to set out an agenda for how the openness turn can and should shape co-design more broadly.

Co-designing is inclusive and can be seen as incorporating already some aspects of openness. Nevertheless, it is only until recently that the concept ‘open’ has been introduced. Partly because the turn to openness in design has so far been driven by practice rather than theory there is no shared meaning. This is however beginning to change. A recent compilation called *Open Design Now. Why Design Cannot Remain Exclusive* (2011), for example, seeks to provide a review of the emerging field. *The Design Journal* has also produced a special issue on openness (Roel 2012). In addition, emerging empirical research analyzes an extensive set of open design projects of both intangible and tangible goods (Balka 2011; West & O’Mahoney 2008). Definitions of open design are evolving also in a peer-driven process carried out by e.g. the Open Knowledge Foundation (OKF 2013).

Different degrees of openness have been developed based on criteria such as: *transparency*, *accessibility* (West and O’Mahony, 2008) and *replicability* (Balka 2011). In addition to those aspects, features such as remixability, shareability and forkability of designs are also discussed (Balka 2011). However openness in design projects does not denote only accessibility and re-usability of tangible modules. Realizing a design may require other forms of designs (e.g. social practices and agreements) (Botero et al. 2010) that should also become part of the equation. This points to the multidimensionality of openness in design. For instance, Avital (2011) classifies openness in terms of conceptual layers: object (design blueprints), process (means of production), work practice, and an infrastructure layer encompassing both technical and institutional foundations for design (Avital 2011, p. 52).

Two main strands can be identified in the practice and literature on open design; a predominant one focusing on design artefacts where the emphasis is put on the openness of publicly available designs (e.g. blue prints as

documents). The other strand is focusing on open-ended design activity and practice (see Abel et al. 2011). This second notion of openness is indicated in co-design research calling for engagement as *infrastructuring* (Björgvissón et al. 2012) and Community-based Participatory Design (DiSalvo et al 2012) unfortunately without addressing openness straight on.

A point of departure for addressing this could be the literature on new modes and characteristics of peer production (e.g. Benkler 2006; Bauwens 2009; Bruns 2008; Engeström 2008) specially those that deal with social networks and digital participation platforms online. An insight provided by this research is that open production and creation often rely on *commons*. Commons are a resource or a resource system shared and generated by a group of people. Ostrom have demonstrated that in order to sustain commons, clearly defined rules and boundaries, and mechanisms for self-governance and monitoring should be in place (Ostrom 1990). Along the same lines control over the used resources is also discussed in context of peer and commons-based production (see e.g. Benkler 2006; Bauwens 2009). These implications of commons and modes or peer production could be linked much closer to collaborative design efforts.

**Table 1** below aims at summarizing the main points of each turn discussed so far to allow for comparison and reflection.

<b>Turns:</b>	<b>Usability</b>	<b>Sociability</b>	<b>Designability</b>	<b>Openness</b>
<i>Frameworks</i>	Human-Computer Interaction (1st and 2nd wave)	Participatory Design (PD) HCI (3rd wave) Computer-Supported Cooperative Work (CSCW)	Meta-design End-User Development (EUD)	Open Design, Open production  Community-based Participatory Design
<i>Main objective</i>	<i>Representing use</i> Understanding task flows,	<i>Observing use</i> <i>Simulating use</i> Understanding Practices and experiences	<i>Stimulating and triggering use</i> environments	<i>Performing use</i> Design for collaboration
<i>Object of co-design</i>	Product	Practice	System	Ecologies, Infrastructures
<i>What users do?</i>	Adapting Misusing	Exploring Rethinking	Extending Improving, Appropriating	Reinventing Forking, Remixing,
<i>Who collaborates?</i>	Expert team (One-shot events by invitation)	Expanded team (pre-defined process)	Expanded team (open-ended)	Peers (on going- long term commitment)
<i>Relation-ship between collaborators</i>	<i>Individuals</i> - Designers reach out to users - Users are informants and in need of representation	<i>Partners</i> - Designers facilitate and stage events - Users are Stakeholders	<i>Communities</i> - Designers provide tools - Users are potential lead users	<i>Collectives</i> - Designers and users are both part of publics
<i>Through what is collaboration enacted?</i>	Personas Scenarios Flow-charts	Prototypes (paper, functional) Thick descriptions of practice Workshops, games Probes	Building blocks Platforms Hacks Toolkits	Repositories Documentation Forks and Spin offs
<i>Modes of production</i>	Mass production, industrial manufacturing		Mass Customization and personalization	Commons based, peer – social production

## CONCLUSIONS: FROM OPEN ARTIFACTS TOWARDS OPEN COMMONS

In our attempt to understand the “Openness Turn” in co-design it is noteworthy to understand how a main drive has been moving closer to people. Another is to remind us of how attributes such as democracy and freedom share connotations with openness, and have been inspiring movements relevant to co-design (e.g. Participatory Design movement). We have traced these developments through four turns in co-design practice and research. First, the usability turn brought people in as users of designed artefacts. Secondly, the sociability turn expanded the space of design stakeholders to be seen as partners. Thirdly, the designability acknowledged non-professionals as designers. Finally, the openness turn locates design in open peer-driven process taking place in a commons that can be nurtured and infrastructured by designers and other collaborators. We must turn more seriously to the implications of creating such commons to ensure the sustainability and relevance of co-design in the future. We hope our work is a contribution in that direction.

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# Emerging Commons Design Economy

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## ABSTRACT

*Several economists and theorists of innovation including Jeremy Rifkin, Yochai Benkler, Michel Bauwens, have concluded that the Third Industrial Revolution is at hand (Anderson 2010; Benkler 2006; Bauwens 2005; Bauwens 2013; Bauwens et al. 2012; The Economist 2012; McCue 2012; Rifkin 2011; Vance 2012 ). Often the discussion around this topic refers to emerging new technologies and processes such as three-dimensional printing or the new wave of rapid manufacturing developed by the open source/hardware community, and the associated distributed ways of organizing design and production. Productions of physical goods requires designs. In this article focus is in open design practices and movement where 3D printing is used. Open design and changes in community practices and networks are connected to above mentioned “revolutionary” technologies and practices. Article introduces four layer model of emerging Commons Design Economy. Open Source practices have revolutionized the cultural content universes of music and software. Why shouldn't it also be able to change the way design is made, distributed and even manufactured? Data used in this research is mostly statistical and thus this research uses statistical methodology. The following research questions will be addressed: What is the composition and layers of ‘open design economy’? What kind of different technological elements, companies and communities it contains? What kind of role CAD applications, 3D printing services, DIY communities, sharing platforms have in open design? How open is open design economy license-wise?*

## KEYWORDS

*Open design, P2P, commons, ecosystem, 3D printing.*

## INTRODUCTION

Open Source practices have revolutionized the cultural content universes of music and software. Why shouldn't it also be able to change the way design

is both made and distributed? Should the art and design teaching be directed away from nurturing the image of the genius as an individual artist? Should communication among artists be fostered instead of merely rewarding originality? Should the artists also learn that copying is not a sin and derived work has value? Design can be taught differently. Mushon Zer-Aviv has experimented, with successes and failures, teaching design with elements known from Open source practices (Zer-Aviv, 2011). Same kind of experiments have been done in larger amount under “Openwear”, a collaborative clothing platform for fashion creation (OpenWear, 2013) . In one example students were expected to design and prototype digitally fabricated interactive objects. The instructor of that course took “open source” approach:

“start from some Open Design, to 'copy' from a series of ready-made that could be easily adapted to the different necessities of a wearable interaction and, in a way, adapt their shape to it. (Romano, 2012)”

Furthermore, Thackara argues that adapting openness is not an option, it's a matter of survival because problems such as climate change or resource depletion “cannot be solved using the same techniques that caused them in the first place” (Thackara, 2011).

One of the rare attempts to describe open design as a whole, is Michel Avital's (2011) four interdependent conceptual layers: object layer, process layer, practice layer and infrastructure layer. Intention is not to provide rival theory, but compliment Avital's work and construct more detailed model of ‘commons design economy’.

Answers to above questions contain elements such as ethics and morale and thus are not easy to approach or solve. But if open source culture has solved such issues, what makes art any exception? Code is poetry, as WordPress mantra says. There is beauty in well-written code. It is not valued by all, but neither is classical music.

The above argument of necessity contains elements which can be found from 'revolutionary' thoughts of several economists and theorists of innovation including Jeremy Rifkin, Yochai Benkler, Michel Bauwens who have concluded that the Third Industrial Revolution is at hand (McCue 2012, Vance 2013, Rifkin 2011, Bauwens 2012, Bauwens 2005, Bauwens et al 2012, Anderson 2010). Often the discussion around this topic refers to emerging new technologies and processes such as three-dimensional printing or the new wave of rapid manufacturing developed by the open source/hardware community, and the associated distributed ways of organizing design and production. 3D Printing is still very limited, especially when it comes to using different materials, combining materials,

but as evolution of technology goes forward, anything is possible.

### **Motivation, methodology and data**

3D Printing is hyped subject. It is however a part of bigger economical transformation that has begun lately. In this article I describe Commons Design Economy, which is one side of the bigger picture.

This research contains elements of inductive reasoning. Previous theories of peer production and Open Design researchers such as Bauwens, Avital and Menichinelli are explored and used as ground for new theory.

Data used in this research is mostly statistical and thus this research uses statistical methodology. Data from surrounding world, namely open design related world, was gathered during October 2012. Data for this article has been collected with two methods. Firstly, author has been in personal contact with companies such as Ponoko, Shapeways, i.Materialise, 3DTin and TinkerCAD. Some of the statistical materials are from those connections. The other statistical material is collected with web scraping, which is a computer software technique of extracting information from websites. In this research, Thingiverse.com content was scraped with ruby script. This solution was selected based on authors perception and also suggested by Thingiverse.com administrators. Some previously collected statistics was also used in this research. Those statistics included survey data from annual peer production community surveys as well as data from 3D printing community survey conducted by the author and Tere Vadén (Moilanen & Vadén 2012).

Research questions are:

1. What is the composition and layers of 'commons design economy'?  
What kind of different technological elements, companies and communities it contains?
2. What kind of role CAD applications, 3D printing services, DIY communities, sharing platforms have in commons design economy?
3. How open is open design economy license-wise?

### **OPEN DESIGN RELATED THEORIES**

Some scholars refer to commons design as Open Design (see for example von Hippel 2005). Massimo Menichinelli has focused on Open P2P Design. His concept differs from Open Design by stressing the need of co-operation instead of focusing on just distributing designs under some commons licenses:

“Open P2P Design is useful to *co-design* a collaborative activity with and for a community: this activity can be the very act of designing, developing and managing participatory public services (including Open Data projects), creating businesses based on communities or just managing interactions between business and communities (as for the Crowdsourcing projects, being careful just not to exploit the users as a way for saving money through participation). (Menichinelli 2011)”

Bauwens et al (2012) use the title collaborative economy with mixed focus to include 1) crowd-sourced design and products under, 2) shared design and distributed manufacturing and 3) open innovation. According to Bauwens, DIY (do-it-yourself) experiences are included in the shared design and distributed manufacturing. The view can be agreed to some extent. DIY as a term refers to one person, doing something alone. Sometimes this one person is following or replicating something that another person has done before, sometimes he or she is experimenting something new. In either case, it's still doing alone. That is also the case when one person does alone the design and manufacturing. Bauwens also adds that web technologies which enable online repositories boost this activity.

Michel Avital has defined Open Design to construct from four interdependent conceptual layers: object layer, process layer, practice layer and infrastructure layer. In Open Design consumer's role is changed to more active one which reflects the looming paradigm change discussed by several scholars (van der Beek 2012, von Busch 2012, Bianchini & Maffei 2012). Active consumers or 'prosumers' as Toffler (1980) labels producing consumers might become part of the production chain in small scale and modify products instead of just consuming mass produced artifacts. Avital goes as far as arguing that in open design emphasis in the use-related capabilities and “prime actors of open design are consumers”. According to Avital (2011) designers play important role in Open Design by producing and sharing working and in some cases modifiable blueprints openly, but manufacturing engaged consumers are the core players.

## TOWARDS COMMONS DESIGN ECONOMY

Design of products has become more and more popular over the past years. Enablers of this open design can partly be explained by second generation open source and open hardware based low-cost 3D printers, new (closed source) online CAD applications such as TinkerCAD and 3DTin, commons driven co-operation spaces like hackerspaces, fablabs and makerspaces, and

sharing platforms such as Thingiverse.com.

None of the above mentioned technologies or communities alone could push forward emerging Design Economy, but the sum of them, co-operation and connections between different parties is what makes the difference.

### **Design is everywhere**

Design has been traditionally done on desktop applications. Design has been the privilege of professionals and companies. This design barrier has been breaking for sometime now. On desktop front, open source CAD and animation applications such as Blender, OpenSCAD, BRL-CAD and Art of Illusion have become better known and more popular.

The other element in design front that is causing changes is the emerging online CAD platforms or applications such as TinkerCAD and 3DTin. These applications are browser based and by so do not require any installation. To label TinkerCAD and 3DTin 'just' CAD applications is a bit misleading. I prefer to use term platform because such solutions offer more than just modeling apps. They offer a place to store and share models, and build-in connections to 3D printing services. The rising popularity among the public is partly explained by easy access (no installation), somewhat easy to use interface, free (no payment) to get started and enough features to enable simple designs. In case of 3DTin the amount of 3D models uploaded or created in the service has grown to include over 80 000 in the end of year 2012. The amount of new models in 2012 was alone a little less than 30 000. The growth since November 2011 has been steady and the amount of uploaded new models is several thousands each month. The designs or sketches as they prefer to label user creations can be licensed under commons licenses. 3DTin encourages sharing via Creative Commons licensing. However, distribution of licenses was not available. 3DTin offers all features for free as long as results (sketches) are shared under Creative Commons. Paid subscription offers private storage. TinkerCAD was also asked to provide statistical information about model counts, but without any success.

### **Communities as libraries and anchors**

Third ingredient in the design evolution are commons driven co-operation/co-creation/co-working/co-production spaces such as hackerspaces and makerspaces. Troxler has created a 'Map of Fabbing' in which different forms of 'fabbing' communities are put based on two aspects (Troxler 2010). Model classifies different forms of 'fabbing

communities' based on how project or infrastructure oriented they are and whether they are generative or reproductive. Troxler's model contains hackerspaces, fablabs, techshops, 100k garages, open source hardware and sharing platforms. Discussing Troxler's model in details is out of scope and thus left out from this article.

Much of the development of new wave low-cost 3D printers has been commons driven. Fabbing spaces offer tooling and community for developers. Some of the spaces are more business allowing that others and some of the 3D printer manufacturing companies have origin in these spaces. The amount of spaces around the world can be count in hundreds if not in thousands. Hackerspaces alone sum over 600 spaces (Hackerspace 2013). The nature of these co-working communities is commons prone and motivation to participate follows the findings from other open source research (Moilanen 2011).

The above mentioned communities and physical spaces are not just places in which hackerminded people meet. They can also be seen as examples of modern time libraries (Troxler 2011). The amount of information among the members is huge and it is shared freely. Some of the information is 'hidden' and transfers only by spoken communication and doing. According to Nonaka and Takeuchi, this kind of information is tacit knowledge. Tacit knowledge can take another form, namely explicit, by writing down the knowledge. Knowledge stored in community wikis and blogs is an example of explicit knowledge (see Hackerspaces Wiki 2013 and von Hippel 2005).

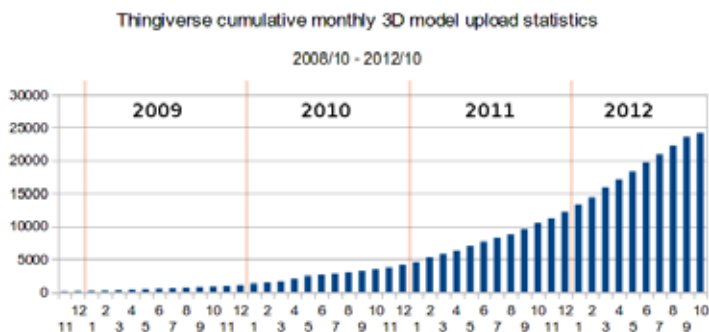
## **Sharing platforms**

Hackerspaces, makerspaces, fablabs and alike are physical places for cooperation and innovation. However those represent just the other half of innovation and sharing platforms. Forth element in Commons Design Economy is sharing platforms. Bauwens et al (2012) describes sharing platforms as:

corporate platforms create the possibility for users to share their own creative work, or what they have found, but no common code or knowledge base is created. The platforms are owned by corporations, and the attention and behavioral data are sold to advertisers. Regulations over these platforms are established by the corporate owners. (Bauwens et al 2012)

Most commonly known sharing platform is Thingiverse.com. It enables 3D model and images upload, and users are encouraged to leave instructions how to manufacture models for example with 3D printers. Some of the sharing platforms enable easy derived work eg continue and enhance

existing models as forks. The popularity of sharing platforms has increased over the past 5 years. The amount of 3D models/designs in Thingiverse.com has grown vastly over the past 4 years as seen in illustration 2.



**Illustration 1: Cumulative upload count of 3D models in Thingiverse.com. Source: data scraped from service website.**

Thingiverse.com users can attach different kind of licenses to their creations. Most of the thingiverse.com designs are licensed under one of the commons licenses. Nearly 42% of the 3D models are licensed under Attribution-ShareAlike 3.0 Unported Commons license, which allows copying, distribution and transmitting the work as well to make commercial use of the work. Second most common license used in thingiverse is Creative Commons Attribution 3.0 Unported (19,6%). When thingiverse.com is compared to Bauwens definition, we can find several similarities. Thingiverse.com is owned by a company and not by any company, but a 3D Printer manufacturer Makerbot Industries. They regulate the platform, community has very little (or none) to say to it, what happens in it, what is allowed and what is not. Users upload models which is the core of thingiverse.com. There is no ‘common code or knowledge base’.

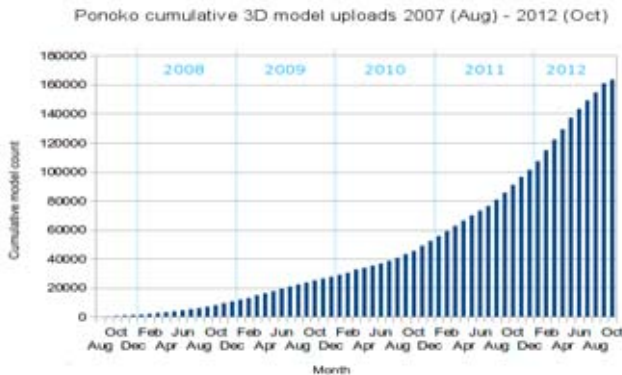
### 3D Printing - manufacturing and services

Low cost 3D printer boom can be seen to begin from RepRap community open source/hardware driven efforts. RepRap project released the first 3D printing machine “Darwin” in March 2007. After that there has been three more: “Mendel” (October 2009), “Prusa Mendel”(2010) and “Huxley” (2010) (RepRap Project 2013). RepRap is the most commonly used 3D printer in 3D Printing community according to global survey conducted 2012 by Moilanen and Vadén (2012). Erik de Bruijn has done research on RepRap community and according to Erik

“The RepRap project is existing proof that the open source development methodology also works for the design of physical objects.” (de Bruijn 2010)



RepRap project has created several spin-offs such as Protobox (Ultimaker), Fab@Home, RapMan (BitsFromBytes), CandyFab (Evil Mad Scientists) and Cupcake CNC (Makerbot Industries).

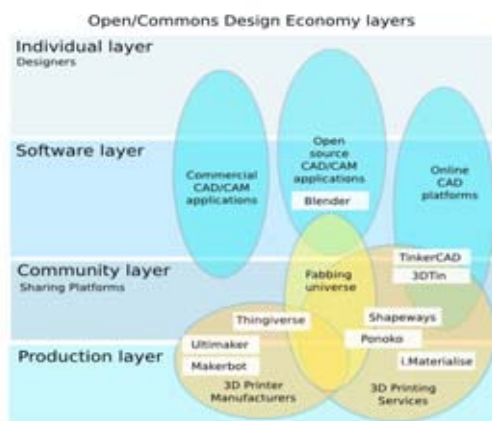


**Illustration 2: Ponoko cumulative 3D model uploads 2007 – 2012**

The popularity of 3D Printing services has grown greatly during the past few years. Ponoko is one of the well-known and commonly used 3D printing service. The amount of uploaded 3D models has steadily grown ever since the launch (See illustration 3).

## COMMONS DESIGN ECONOMY LAYERS

Based on the above introduced research results a preliminary construction for Commons Design Economy is introduced below. The model contains four horizontal layers and multiple vertical layers crossing ovals (application areas): Individual layer, Software layer, Community layer and Production/Manufacturing layer.



**Illustration 3: Preliminary Open/Commons Design Economy model.**

Individual layer contains people who do design and also develop open

source software. Software layer contains tools used in 3D modeling. Those tools can be divided to two categories: desktop and online. Desktop applications in turn can be divided to open source and commercial. Online CAD tools refers to newly developed browser based CAD applications such as TinkerCAD and 3DTin. Community layer contains sharing platforms and common communication platforms in which people discuss and communicate design related issues. An example of sharing platforms is Thingiverse.com. Open Design community does not seem to share 'work in progress' models or partial designs partly due to lack of widely accepted sharing tools or platforms. Instead, ready-made 3D models are shared for example in Github, PirateBay and Thingiverse.com.

Some of the services in design world overlap with multiple layers. Online CAD platforms – TinkerCAD and 3DTin – are classical examples of such. Designer uses CAD application in browser and saves the models in same service for others to use. Some of the models however can be private and not available in public. In other words, not all models even in online CAD services are freely used or derived by others. As it was mentioned before, Thingiverse.com is sharing platform. In the figure, it is however placed near next layer. That is because as far as I know, thingiverse.com is connected to Makerbot industries which develops and sells 3D printers. Shapeways and Ponoko are printing services, which also partly function as sharing platforms, but which also contain possibility to get models printed and shipped to you. It must be noted that online CAD platforms are more and more connected to printing services and by so spreading the layer overlapping on their behalf. In some of the above services you are able to sell your designs.

The last layer in the bottom is Production layer. It can be divided although partly artificially to two parts: 3D printer manufacturers and 3D printing services. It contains companies and communities which develop and sell 3D printers. Ultimaker is located near the community layer, because it uses community extensively for example in creating and updating assembly instructions. One obvious community in production layer which also would overlap with the community layer is RepRap. The layer contains also 3D printing services, which normally operate globally.

The Fabbing Universe in the above illustration refers to different kind of DIY communities such as hackerspaces, makerspaces and alike. Those spaces also have often extensive tooling and manufacturing devices. Some of those spaces are already oriented to serve external people for example in producing prototypes and such, and are funded by companies such as Autodesk (Wakefield 2012). In that sense it's logical to put fabbing universe

oval (bright yellow) both in community and production layer. It is also common that communities of fabbing universe develop tools and software and that's why it extends to software layer as well.

Market-driven entities have strong presentation in the current "Commons Design Economy". Much of 3D Printing is in hands of a few companies (Shapeways, Ponoko, i.Materialise and Sculpteo), which provide small-scale manufacturing as a service (MAAS). According to survey conducted among the 3D Printing community (Moilanen & Vadén 2012), those services are used by 'end-users', not open source/hardware driven developers or early adopters. The latter group uses mainly own locally build or local developer community owned low-cost printers.

## DISCUSSION

There are traditional companies doing design behind closed doors, often with closed source applications and production is based on closed source hardware. However, the interest towards different kind of economy is rising. This new design economy is partly commons based, which is visible in 3D printable models which are commonly licensed under some commons license.

3D Printing services also enable other kind of business, namely design business. Members of community can upload own models to service and get profit either by offering own models for sale or by getting own models reprinted (ordered) by others. Users can do design in TinkerCAD and then choose to export models and manufacture locally. Together, printing services with online CAD platform providers and designers (just about anyone) can create a little ecosystem. It benefits the users as well, since it makes the design – to – object process more simple.

Introduced model describes emerging Commons Design Economy with four layers much like Avital's model but with concrete examples and slight differences. Both models discuss same subject but with different emphasis. Avital stresses the infrastructure layer which refers to underlying institutional and technical foundations of open design while above discussed Commons Design Economy model focuses more on networked and intertwined nature of components and layers. The model stresses co-operation over sharing results under some commons based licenses, which is similar compared to Menichinelli's Open P2P Design approach discussed above. Furthermore, above discussed model is based on statistics collected from Open Design community practices and members.

Commons Design Economy is at the moment a hybrid model. Design can be

done for free with Open Source tools, but manufacturing is at least partly in the hands of corporations. Commons based Design Economy and Open Design community is still immature and seeks 'borders' which is visible in the debate around 3D printable guns for example (Morelle 2013). Yet the movement around Open Design is evidently growing, getting stronger and more loud. Introduced model needs more research to clarify identified components and connections between them. Nevertheless, if Open Source is about distributed development, then Open Design is about co-operation and distributed design and manufacturing.

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# Entrepreneurial activities in innovations in large firms – a theoretical study

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## ABSTRACT

This study focuses on actions of innovations by studying the theories of innovations and entrepreneurship. As actions involve knowledge and motivation, this study has a wide approach to explain the emergence of innovations, and particularly the front end of it. The study is done as literature review, which results in the identification of many types of different actions. These are categorized and presented as a model that explains and describes several important phenomena in the innovation emergence and development.

## KEYWORDS

Innovation, opportunity recognition, corporate entrepreneur

## INTRODUCTION

### **Background**

Among the increasing number of research and literature on innovations, the early phase or the “fuzzy front end” of innovations has been researched only limitedly in spite of its importance particularly for the value of the innovative idea (Scott and Bruce, 1994, Koen et al, 2002, Kim and Wilemon, 2002, Reid and de Brentani, 2004, Poskela, 2009). The early phases of innovations include components that are difficult to research. Koen et al (2002, p. 6) describe the fuzzy front end as being experimental, chaotic, unstructured and iterative. Ardichvili et al (1996) and Zahra (2008) demonstrate the accidental nature of discoveries, and many entrepreneurial studies underline the uncertainty of innovations and opportunities, thus making the fuzzy front end complicated to investigate.

However, an interesting approach to study on a detail level the front end of innovations is the concept of the corporate entrepreneur or intrapreneur, or an individual, who spontaneously and autonomously or self-determinedly searches, identifies and develops a new, uncertain opportunity. As entrepreneurial opportunities are mainly different kinds of innovations (Casson, 1982, Companys and McMullen 2006), the theories of entrepreneurship and opportunity identification are a useful and a relatively unexplored area for the innovation research.

### **The action focus and the benefits of the study**

In addition to the above benefits, the entrepreneurial theories bring in also other new perspectives to innovations. One of these is the emphasis on action, e.g. McMullen and Shepherd (2006) start their article by the

statement: “entrepreneurship requires action”, and explain further how this is manifested in the identification of opportunities (p. 132) and creation of new products or processes. The entrepreneurial approach underlines also actions of obtaining or creating new information, which together with prior information leads to opportunity recognitions (Shane and Venkataraman, 2000, Shane, 2000). According to them the opportunity identification is then followed by the decision to act by the entrepreneur.

Actions involve knowledge and motivation (McMullen and Shepherd, 2006). Actions have goals (Gollwitzer and Bargh, 1996), they are temporally separated and they produce outcomes. However, actions to develop new things and find out answers which hitherto have been unknown are naturally uncertain (Shane and Venkataraman, 2000). Also because of the temporal dimension, the outcomes of actions are uncertain (McMullen and Shepherd, 2006). Thus the entrepreneurial motivation is essential, and focusing on entrepreneurial actions gives us information about the motivational factors of corporate entrepreneurs or CEs to overcome uncertainties and doubts.

## THEORETICAL FRAMEWORK

### The research question and method of the study

Even if innovations have been researched from many aspects, there has been a limited focus on actions and their outcomes. Certain innovation theories describe innovative behaviors, but mainly on a higher level as an aggregate of activities, for example problem solving styles or support and resource supply for innovations (Scott and Bruce, 1994), or with other larger categories. Also the roles and activities of innovation champions have been studied in many articles, but however, their role is essentially different from the role of CEs. The main difference is that, according to many definitions, a CE finds spontaneously a new, potential opportunity, and, possibly informing his superiors, determines to find out more information about this by discussing, networking, experimenting, analyzing or drafting plans before he thinks the potential opportunity has been analyzed sufficiently for an official proposal to management. Thus, in addition to formal product development projects in firms, there are also unofficial development projects, which can bring new important businesses to the firm. The innovation champion is usually nominated by the management, and normally starts his work when the opportunity has been already identified, the value estimated and the development approved by the management.

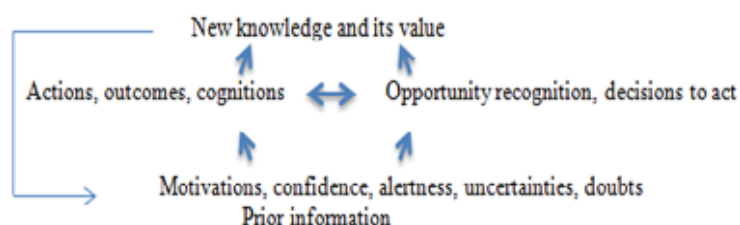
The research question for this study is accordingly: **“How and why does the corporate entrepreneurship emerge in innovations in large firms?”**, thus making it necessary to build on the theory areas mentioned earlier. Methodologically this study is a systematic literature review using the method of realist synthesis (Tranfield et al, 2003), and as a result, the so called “best evidence” for management practices can be identified. The research question then gets the meaning: “What works for whom in what circumstances”. This approach seems very suitable for the action based innovation research because of aiming towards a synthesis of many theories.

## Initial model building for the review

Prior starting the review it is useful to define the criteria of selecting the most relevant articles. For this purpose I build an initial model as the first step to guide the selection, which model illustrates in the best way the research question, and extant descriptions of the phenomena and models. This model is constructed from the theories and concepts of innovations, entrepreneurship, opportunity recognition, corporate entrepreneurs, knowledge management, and accordingly the following well-known and often cited concepts are selected:

- Exploration, containing search, variation, risk taking, experimentation, play, flexibility, discovery, innovation (March, 1991).
- Divisioning the entrepreneurial opportunity recognition into discovery, or systematic scanning of the environment, and creation, or an undefined “trial-and-error” process where the final result can be more or less unknown (Alvarez and Barney, 2007).
- The opportunity recognition models of Shane (2000), and Shane and Venkataraman (2000)
- The concepts and definitions of knowledge management by Newell et al (2009) and Tsoukas and Vladimirou (2001).
- Motivational theories related to entrepreneurial rewards and uncertainty (McMullen and Shepherd, 2006) and self-determined goals, and uncertainty- and success- orientation (Gollwitzer and Bargh, 1996).

The initial model from above theories include assumptions that innovation or opportunity recognition requires prior information and cognitive properties to value it, then followed by a decision to act (Shane and Venkataraman, 2000). These, however, require motivations of the individual (McMullen and Shepherd, 2006, Gollwitzer and Bargh, 1996). As a result, various actions are taken with different results, which are described by March (1991) and Alvarez and Barney (2007) on the entrepreneurial level, and Newell et al (2009) and Tsoukas and Vladimirou (2001) on the knowledge creation level. As a result, an opportunity is recognized, but this also is new information or knowledge which requires valuing, and usually this new knowledge leads to iterations to new actions and their motivations.



**Figure 1: The relations of components impacting on entrepreneurial actions and the opportunity recognition**

The main differences between the above model and extant models of innovations and opportunity recognition are the following: this model includes the motivational factors which are important in the context of a firm; it pays attention to actions and decisions and presents the information as the origin of actions, which actions then also create new knowledge, indicating an iterative nature of the model. As the model is



based on entrepreneurial actions by independent entrepreneurs, the research question investigates whether these types of actions by CEs can be found also in the context of established firms, or what other actions by CEs can be identified.

## ENTREPRENEURIAL ACTIONS IN ESTABLISHED FIRMS

### **Prior information and valuing it**

*The valuing of information and opportunities:* Shane and Venkataraman (2000) suggest that the informational sources of opportunities and asymmetries of information and beliefs are the preconditions for the existence of entrepreneurial opportunities (2000). This means that because the information and belief stock are different with different people, only a subset of the population will discover a certain opportunity. Similarly Nelson and Winter (1982) proposed that information is stochastically distributed, some people have information that others do not possess, and this information could be customer problems and needs, production development and advancements, new technological development results, or scientific research in many areas. Compans and McMullen (2006) describe that because of experimenting costs and other search costs, firms can engage only in a limited amount of search actions, and they also conclude that combined with bounded rationality, these factors mean that it is impossible to identify all possible entrepreneurial opportunities.

Shane and Venkataraman (2000) summarize the recognition of new opportunities as the following: 1.) the possession of prior information, and 2.) the cognitive properties necessary to value the information. Certain personal factors may impact in an increasing or limiting way on the discovery of opportunities, such as personal work experience, education, or other means (Shane, 2000), but individuals also have different cognitive properties to value the information and abilities to discover new means-ends (Kirzner, 1973). The model of Shane and Venkataraman is completed by the decision by the entrepreneur to act for further developing and exploiting the opportunity.

The arguments that individuals and organizations have different knowledge stocks for ideas and opportunities, and individuals have different cognitive properties to value the information and opportunities are important, and lead to conclusions that it is not known ex ante which individual or team will have a novel idea or recognize a new opportunity, or who individual recognizes a specific value for a particular piece of information or opportunity that could be developed into an innovation.

*The importance of new information:* As described by Nelson and Winter (1982) different individuals have different sources of new information. Shane (2000) has developed this further in his model by adding also the impact of new information, e.g. about new technology. When the new information is complementary with the prior or personal level idiosyncratic information, this can lead to the recognition of an opportunity. In the model of Shane (2000) the new information, e.g. technical invention, is moderated by prior information which both then impact on the opportunity recognition. This is then followed by the “approach to exploitation”, and also this link is moderated by the prior information. Thus in the model of Shane there are two elements of information: the prior information of the firm or and individual, and the new knowledge about a technical invention.

Shane and Venkataraman (2000) demonstrate the importance of new understanding of relationships, and posit that “people must be able to identify new means-ends relationships that are generated by a given change in order to discover entrepreneurial opportunities”, whereas the inability of seeing new means-ends relationships may result in failing to discover an opportunity. According to them visualizing these relationships is difficult, but their conclusions suggest to further investigations of insights or new relationships or associations between new and prior information.

The above arguments and conclusions emphasize the roles of prior information, new information and cognitive properties to value them both. These components can be examined also from the perspective of actions, i.e. what needs to be done by an entrepreneur or a CE to progress towards a discovery of an opportunity. Although it is difficult to know *ex ante* which individual will create what idea, however, as soon as the individual has already new thoughts related to some new information and prior information, his motivational factors may encourage him and impact on the decisions to act further. Dyer et al (2008) investigated behavioral differences between innovative entrepreneurs and executives of established firms by interviews, and found out four specific groups of behaviors that were typical for innovative entrepreneurs: (1.) questioning, (2.) observing, (3.) experimenting and (4.) idea networking. Interestingly, all these categories and results revealed that innovative entrepreneurs have a great interest for finding out and exploiting new information. This indicates that gathering of new information and combining it with prior information for new innovations are among essential actions of entrepreneurs and also CEs within the firm and within external networks.

*Summary of potential actions by CEs:* CEs gather new information, associate it with prior information and finds value to new associations, insights and emerging opportunities.

### **Activities of problemistic and slack search**

*The different roles of search:* Levinthal and March (1988) distinguished the wide concept of search of new technologies into the categories of problemistic and slack search. The former is defined as taking place when the firm’s target exceeds the performance, and the search focuses on immediate results of refining the existing technology, efficiency and finding out “discoveries in the near neighborhood of present activities”. The latter mode of search takes place usually when the firm’s performance exceeds the targets, creating slack in the organization. The slack search includes undiscovered improvements in current technology, innovations, and works also as an inventory for unexploited ideas and refinements in a technology. The slack search is described as being directed more to sub-unit or individual objectives instead of explicit organizational targets, and it may have several ways to express itself in the organization. Additionally, Levinthal and March (1988) posit that the distinction of the different search modes provides ways also to understand the success and failures of innovations in organizations. Although Levinthal and March point out the organizational inefficiencies as origins and the pet project nature in the slack search, the further research has pointed out that actually in slack search individuals work for the refinement of technology by solving particular problems and testing various hunches and hypothesis (Adner and Levinthal, 2007). Sometimes the slack search outcomes create accidental but valuable discoveries that can be used in other parts of the organization (Levinthal and March, 1988).

*Activities in slack search:* As individual or sub-team objectives are usually the origins for the slack search, it is often typically non-directed or autonomous, and accordingly individuals in these cases act as CEs. More clarification of the activities and roles of this nature are given by Reid and de Brentani (2004), who found that the structure of information and problems in incremental and discontinuous innovations are different. According to them, information and problems are structured in incremental innovations, and unstructured in discontinuous innovations. They propose (p. 177) that because the information and problems as origins of the early phases of discontinuous (or radical) innovations are typically unstructured, this information is brought to organizations by key individuals who are not explicitly directed by other persons in the organizations, e.g. by management.

In the early phases of discontinuous innovations the individual first develops a structure for the problem or information, and at this phase it is not structured yet at the firm level. Reid and de Brentani (2004) suggest that there are two types of activities by these key individuals of discontinuous innovations, either being a conduit for information regarding technology, or for information that impacts the ability to link advanced technologies to market opportunities. They continue accordingly by distinguishing these activities into the roles of technology visioning and market visioning. They further describe these autonomous, non-directed activities followingly: “Indeed, much of the early-information search in the case of discontinuous innovations may be driven by these key individuals, without involvement or knowledge of larger groups of people, particularly those operating at higher levels of organizations. As such, the role of the individual takes a heightened importance.” This is well understood in cases of uncertain opportunities emerging from problems which are unstructured or even not widely recognized.

*Summary of potential actions by CEs:* CEs do non-directed search activities that have been identified and started spontaneously by individuals or small teams. CEs transfer information of new technology from outside the firm and take actions of technological and market visioning.

### **Activities of discovery and creation**

*Discovery opportunities:* The large category of “exploration of new possibilities” (March, 1991), including examples of “search, variation, risk taking, experimentation, play, flexibility, discovery, innovation” have been further divided by Alvarez and Barney (2007) into discovery and creation opportunities, thus offering a possibility to specify more in detail the possible entrepreneurial activities emerging from exploration. Origins of discoveries are the competitive imperfections in the markets, e.g. caused by changes in the technology, consumer preference or similar areas. The authors posit that “the discovery theory is predominantly about search – systematically scanning the environment to discover opportunities” (p. 128). This can be understood as the result of the continuously changing markets because of the continuously evolving technology, economy, populations, nature and other factors. New changes may cause equilibrium in the markets, e.g. possibilities to produce at a lower cost, better products, bigger or smaller demand and so on. In these cases the entrepreneurial search takes the form of scanning of the potential areas where changes may have taken place, and as a result the entrepreneur identifies or discovers a possibility to act towards the equilibrium for earning profits.

The competences and activities in cases of discoveries have been investigated by O'Connor and DeMartino (2006) by a case study of 12 firms for the identification of the needed competences for radical innovations. Although their definition of discovery is not exactly identical with the one of Alvarez and Barney, it offers a good view to understanding of the early discovery phases of innovations. They identified three competences and areas of activities in most of the 12 firms in their case study: discovery, incubation and acceleration (p. 489). The authors describe the discovery competences and activities followingly: “the needed discovery skills are exploratory, conceptualizing skills, both in terms of technical, scientific discovery and external hunting for opportunities”, and “discovery activities can include invention, but need not always.” These activities in firms can be systematic enriching of the discovery, iterations for improvements and adding more, new or better features to the innovative opportunity.

*Creation opportunities:* The creation theory suggests that there is not necessarily any existing markets to scan for disequilibrium, but the entrepreneur's perceptions are essential for the opportunity identification, and in fact only a beginning for further ideas and variations (Alvarez and Barney, 2007). Alvarez and Barney describe this process as an undefined “trial-and-error” process where the final result can be more or less unknown, and in many cases the initial beliefs of the entrepreneur will change to new ones in course of the development, which can even take the form of one or more iterations. In this process the market will act as testing the validity of the beliefs and results of the development. Applying these activities to the context of CEs, it is possible to assume that interested and knowledgeable individuals follow their environments, markets, customers, competitors, and also internal issues and developments in their occupancy, and associate their findings to use cases.

*Summary of potential actions by CEs:* CEs explore their environments and conceptualize their findings into workable models, images and goals where and how to apply their findings. CEs perceive opportunities to start new innovation creation based on firm's capabilities, or to start iterative trial-and-error experiments to create innovations.

### **Search and scanning for making associations**

*Scanning for new information and association:* Kaish and Gilad (1991) found that, compared to the Kirznerian thought of search, which may produce unplanned or even surprise opportunities (Kirzner, 1997), there exists also a search mode that they call as the associative search. This can be understood as a result of search that focuses on new areas, and even doesn't have to be a deliberate activity (Kaish and Gilad, 1991). The associative type of search produces opportunities that have been unknown. In analyzing its nature they divide the elements of the associative search in three components: (1.) sources of information, (2.) alertness to information and (3.) information cues. In their study they found out two key elements that are important in finding novel entrepreneurial opportunities: the behaviors of scanning and networking. According to Kaish and Gilad the associative search is predominantly scanning, and describe this as “entrepreneurial search”, which is broad and indirected, as the problemistic search is deliberative and initiated by management.

Reid and de Brentani (2004) analyzed how the new information from the environment enters the firm, its organizations and interacts with it. They

introduce the concept of patterns and pattern recognition which is a form of distinction making, helping to separate between relevant and irrelevant information. They divide this process into three phases: 1.) perception, which means quick identification, clear understanding and interpretation ability, 2.) reconstruction, which means representation ability, creative imagination, inference and synthesis, and 3.) classification which means evaluation. An individual recognizes patterns in the information from the environment, and it is the individual's ability to make the distinction regarding market needs or new technology paths that is the starting point for building new organizational knowledge.

*Alertness and attention for associations:* The above models of Kaish and Gilad, and Reid and de Brentani both pay attention to quick identification and alertness to a particular part of information and its interpretation. In the associative search the origin can be an interesting new area which the entrepreneur decides to scan or have a look. Kaish and Gilad posit that the origin of associative search is not specifically solving a particular problem, but associative search is based on readiness to recognize a novel opportunity when it is encountered. Also Dyer et al (2009) found the activity of associating of information to “seemingly unrelated questions, problems, disciplines, fields, or ideas”.

*Summary of potential actions by CEs:* CEs scan the environment for identifying new information to be associated with firm's prior knowledge. CEs scan the environment for identifying new information in the form of existing problems of customers, users or other interest groups.

### **Identification of problems and interpreting of them**

*The search for problems and solutions:* The importance of identifying and solving problems as origins of innovations has been demonstrated by many authors. Problems, deviations and differences from expectations can appear in products, services, and also in internal processes or routines of firms. Nelson and Winter (1982) suggest that “useful questions arise in the form of puzzles and anomalies relating to prevailing routines”. Finding out root causes to problems, deviations and differences will often reveal new important information, which can lead to new solutions. Problem solving can be divided in different phases, such as the problem identification, interpreting it and idea generation which phases are often related to each other. L. A. Liikkanen (2009) researched in his dissertation the idea generation process in the context of conceptual design as part of the product designing process. He investigated four different models of idea generation and in three of them the problems had been identified either as an important origin of ideas, or as a contextual factor. Problems had also an important role in his Model-L that was the development results of his dissertation, and the Model-L contained structured top-down problem-solving approaches for idea generation.

*Consequential problems and the problematization process:* For a wider analysis of problems in the context of identifying opportunities I propose the large category of problems to be divided into two main classes: direct problems and consequential problems. The former category contains the conventional types of problems which may appear in the products, production and other processes. In cases of consequential problems, the firm may realize a new trend that could increase or decrease the sales of certain products, or learns about new technological standards, platforms, products, inventions or e.g. government requirements, and in these cases

the problem is to find out how the firm could transform these environmental changes into opportunities for the firm and discover or create a solution to these. The firm needs to frame the new situation and find out new plans for the new situation. In both problem categories new innovations are possible, and this underlines the importance of the search of problems and solutions.

The importance of problematization or making problematic or stimulating questions is also confirmed by empirical research. Dyer et al (2009) studied differences in entrepreneurial behaviors between executives of firms and innovative entrepreneurs, and they found that among four observed differences, the behavior of questioning was found in most of the innovative entrepreneurs. They write (p. 323): "...as they think and brainstorm, they like to ask for example *if we did this, what would happen?*, and describe that some of these questions were aimed to challenge the status quo, and some were repeated several times in different forms to find out real root causes. These questions then resulted in finding out more novel information or even new problems and possible new solutions. As to the opposite, the executives of firms were less frequently mentioned to ask "what if" questions. Some executives even avoided to ask openly questions that could challenge the existing strategy or business model, thus indicating the organizational impacts hindering at least certain actions to create innovations.

*Summary of potential actions:* CEs identify problems and find out solutions to them, and problematize or frame new trends and changes in the environment for creating new solutions to new trends.

### **Idea hunting, idea gathering and networking**

*Hunting and gathering of ideas:* O'Connors and DeMartino (2006) discuss several practices of hunting and gathering ideas in firms internally and externally in their case study of competences of radical innovations in 12 firms. In addition to internal R&D activities that were in place in the great majority of the investigated firms, also a big majority applied the open innovation practices, licensed technologies, or invested in small promising firms. Specific roles were also in place in the investigated firms for idea hunting, analyzing and developing future trends, building networks of creative individuals within the firm, and also new technology identification processes had been established. Idea hunting, gathering and promoting can be understood as a networking activity, either by nominated idea hunters or by CEs who need to acquire more information and potential further avenues of development for their opportunities, and also more ideas for their new opportunity identification purposes.

*Networking for sources of ideas:* In the research of Dyer et al (2008), many of the studied innovative entrepreneurs mentioned that most of their ideas came from networking or sources of outside inputs (p. 327). The networking is done by meeting and talking to new people and asking their perspectives on different issues, looking for insights from unexpected directions and ideas from unusual places. Networking in innovation cases also inside firms is important and can take many forms. Hardagon and Bechky (2006) studied six prominent innovative firms in the U.S. whose business was focusing on knowledge creation and new solutions for customers. The authors developed a model of collective creativity in organizations and detected that instead of being a constant phenomenon, it is rather a "series of momentary, transient phenomena" occurring when

“interactions between individuals trigger new interpretations and new discoveries of distant analogies” which analogies individuals could not have detected alone. In their case study Hardagon and Bechky (2006, p. 489) found out four sets of interrelating activities that are important in these triggering moments: (1.) help seeking, (2.) help giving, (3.) reflective reframing, and (4.) reinforcing.

*Summary of potential actions:* CEs establish internal and external networks for hunting and gathering ideas, for analyzing and developing future trends, to participate in new technology identification processes, to provide help for solutions, ideas, opportunities, and participate in networks of idea and innovation development.

### **Observations, distinctions and the creating of new knowledge**

*Observations and distinctions as the origins of new information and knowledge:* As mentioned earlier in this text, Dyer et al (2008) found the activity of making observations as an important component in behaviors of entrepreneurial managers. Making distinctions in the early phases of innovations have been mentioned earlier in this text by Reid and de Brentani (2004), who explained its role in recognizing differences in patterns. In the theories of knowledge management Newell et al (2009) define knowledge as the ability to discriminate within and across contexts, and further by terms as “the practice of making distinctions”, referring to Tsoukas and Vladimirou (2001).

Because knowledge is defined as a capability drawing distinctions, which is based on previous learning, it is possible to conclude that new knowledge is made of new types of distinctions, which are often based on new observations. Koivisto (2011) analyzed the emergence of new knowledge as a two-phased selection process, where the components are firstly the making a new distinction in relation to something, and secondly assimilating or accommodating this knowledge to the existing knowledge and experience base. Building on the above definitions and arguments it can be concluded that observing and distinguishing something different or specific in some context, are important elementary pieces of knowledge. Making new distinctions creates new pieces of knowledge which can be used in different ways. Considering the observations and distinctions from the action perspective, these represent the analytical activities in relation to new information or circumstances. A new event, outcome, result of an experiment, or a new product of a competitor or a novel future scenario needs to be observed, distinguished, examined and analyzed for differences, deviations or novelties to make a distinction, and associated with existing knowledge.

*Summary of potential actions:* CEs make observations and analyze them for new distinctions and for creating new information. CEs create new understandings, insights and ideas by associating new observations, distinctions and outcomes of actions to the prior information of individuals.

### **Motivational factors in idea and opportunity creations**

*Uncertainty:* The entrepreneurial uncertainty and its hindering impact on actions have been described many authors (Levinthal and March, 1981, Shane and Venkataraman, 2000, McMullen and Shepherd, 2006). The relations of individuals and their actions to uncertainty has been studied by Richard Sorrentino (Gollwitzer and Bargh, 1996), who suggested that

people range along the continuum of “uncertainty-oriented personality to certainty-oriented personality”. The former have a need to know and find out new things about themselves and the world around them and are motivated to resolve uncertainties, whereas the latter believe it is not good to find out new things. He investigated also the action and achievement motives of the uncertainty/certainty-oriented personalities by distinguishing the personalities also into success-oriented and failure-threatened individuals. The former describes persons “who value pride in accomplishment and have little shame over failure” and the latter those who fear failures more than they pride accomplishments.

*The randomness and alertness:* As earlier shown, insights, ideas and inventions emerge randomly to a substantial degree (Ardichvili et al, 2003, Zahra, 2008, Kirzner, 1997). The random emergence of new insights, ideas or inventions can be seen as an important factor for the individual's motivation in several ways. For the individual these can be either unique events (Sarason et al, 2006), or occasional, but relatively rare events, depending on the work role and skills of the individual. It can be concluded that in both cases the uniqueness or the rarity of the new idea or invention has a great motivational impact for the individual. It can be the individual's rare chance to a better financial position, better reputation or higher position in the firm. In these cases the emergence of ideas and insights bring the personal goals of the CE closer to their realization, thus increasing the motivation of the individual (Gollwitzer and Bargh, 1996).

## SUMMARY AND CONCLUSIONS

The literature review of entrepreneurial actions in innovations in different theories revealed many types of different actions. Further analysis of them leads to the identification of different natures of these actions, and the following, illustrative types can be derived from the outcomes:

- A) Cognitive actions of observing and analyzing to create distinctions, scanning to create associations and insights, and solving problems to achieve new solutions.
- B) Framing actions to create ideas or mental images from insights, creating plans to achieve goals, finding applications to ideas, reflective re-framing, and finding value to information and outcomes of actions.
- C) Social actions of networking, idea gathering, idea hunting, help asking and giving, and participation in teams.
- D) Physical actions of constructing, experimenting, testing, re-trying and searching of information.

These findings from theories and empirical research results confirm the existence of the phase “actions, outcomes and cognitions” of the model in the figure 1, and give indications about their nature and type. Also the chapter “Motivational factors in idea and opportunity creations” indicates the importance of the motivational ground, which in cases of CEs can be even exceptionally high, depending on the motivation orientation of the CE, and whether the CE has been personally involved in the early phases of the idea and discovery creation phases. The model in the figure 1 provides new understanding for the fuzzy front end of innovations, and for the role of corporate entrepreneurship and actions in innovations. The study as whole created new understanding for the research question “How and why does the corporate entrepreneurship emerge in large firms?”.



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## Theme 2

The Management and Organization of “CO”



# Alliance Market Orientation, New Product Creativity, and New Product Performance in High-Tech Industries

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## Abstract

*Market orientation has traditionally been examined as an intra-firm concept. However, as firms often collaborate with other firms to create offerings that have superior value to customers, there is a burgeoning need to explore market orientation as an inter-firm phenomenon. Consequently, this paper conceptualizes alliance market orientation (AMO) as a capability that enables an alliance to (1) jointly and systematically gather market intelligence, (2) inter-organizationally coordinate and disseminate the knowledge gleaned from the market intelligence gathered, and (3) efficiently and effectively respond to the knowledge that is coordinated and disseminated. Using data from 246 dyadic new product alliances in high-tech industries, the authors operationalize AMO as a second order construct, explore its impact on new product outcomes, and investigate four antecedents of AMO: joint top management support, goal congruency, trust, and commitment. The results indicate that AMO has a significant positive effect on the new product creativity of alliances and that it completely mediates the effects of its antecedents on new product creativity and performance. The authors discuss theoretical and practical implications of these results.*

**Keywords:** *alliance market orientation, new product performance, R-A theory.*

## INTRODUCTION

As a key part of implementing the marketing concept, market *orientation*, with its emphasis on *both* consumers and competitors, has become increasingly important to the theory and practice of marketing (Kohli & Jaworski 1990; Kumar et al. 2011). However, most extant research examines market orientation as an intra-firm concept, whereas firms often collaborate with other firms to create market offerings that deliver superior value to customers (Hunt & Lambe 2000). Accordingly, some theorists posit that market orientation is applicable at the network level and, therefore, can be

viewed as an inter-firm phenomenon (e.g., Rindfleisch & Moorman 2001). These theorists argue that firms in a network should effectively and efficiently compete with other networks by developing a superior capability to understand and meet their markets' needs. Therefore, there are grounds for considering market orientation to be applicable to *inter-firm* activities, not just *intra-firm* activities.

One type of inter-firm activity that might benefit from being market oriented is a new product (NP) development alliance. These alliances are especially prevalent in high-tech industries. In this article, we develop the concept of "alliance market orientation" (AMO) to describe the joint, market-oriented activities of NP alliances. Why might an alliance market orientation be important? The answer lies in the notable shift to a more market-focused view of alliance activity. Furthermore, we argue, as long as the sole focus of attention within a given NP development alliance is on the ongoing relationship and inter-organizational harmony, the alliance could potentially miss out on emerging market opportunities. This "missing out" could adversely affect the alliance NP development performance. Therefore, the present study aims to investigate whether the market-sensing ability of the respective alliance matters for NP development success.

## THEORETICAL BACKGROUND

Our conceptualization of AMO extends the definitions of market orientation to the inter-organizational context. We conceptualize AMO as a higher order construct having three components: inter-organizational customer orientation (IoCustor), inter-organizational competitor orientation (IoCompor), and inter-organizational coordination (IoCoor). IoCustor is the alliance partners' joint efforts to understand its target market's needs and preferences. IoCompor is the alliance partners' concerted efforts to identify, analyze, and respond to competitors' strategies. IoCoor is the extent to which alliance partners integrate and disseminate gathered market intelligence across firms, synchronize their NP development activities, and respond to each other's needs and requests to create superior customer value.

Although the concept of AMO shares affinities with the concept of MO, there are three important differences. *First*, AMO is a collaborative effort at an inter-organizational level. Whereas MO is the *organization-wide* coordinated application of inter-functional resources for the creation of superior customer value, AMO is the *inter-organizational wide* resource coordination to better anticipate and respond to changing market requirements ahead of

competition. *Second*, market orientation has been discussed as a potential resource that is housed *within the firm* (Hunt and Lambe 2000). However, a firm's critical resources may extend beyond firm boundaries, be embedded in inter-organizational routines and processes, and become idiosyncratic, inter-firm linkages (Dyer & Singh 1998). Studies suggest that the competitive advantage of an alliance is more likely when alliance partners make relationship-specific investments (Spekman et al. 1999). Resource-advantage (R-A) theory views these relationship-specific investments as idiosyncratic resources: they are created by the relationship (Hunt & Morgan, 1995). This study conceptualizes AMO as an idiosyncratic resource that is (1) developed during the life of an alliance and, thereby, housed *within the inter-organizational* routines and processes, (2) unique to the alliance, and (3) a higher-order resource. In this respect, AMO is an idiosyncratic, inter-firm, relationship-specific resource that supports the alliance partners' efforts to generate a position of competitive advantage in the marketplace that will lead to superior financial performance. *Third*, because MO, as a resource, is housed within a single firm, to understand the routines and processes of MO, one focuses on "firm" as the unit of analysis. In contrast, because AMO is a relational property that is mutually determined by each alliance partner's behaviors in the relationship, a dyadic approach is required. In our study, we conceptualize AMO as an *idiosyncratic* resource: it is developed by the alliance (Lambe et al. 2002).

Our theoretical framework focuses on the factors that are likely to affect the development and management of AMO as an idiosyncratic resource of the alliance partners (see Figure 1).

--- Insert Figure 1 about here---

## Consequences of AMO

For R-A theory, idiosyncratic resources play a major role in enabling alliances to produce efficiently and/or effectively market offerings, such as novel and meaningful products that have value for some market segment(s). Although the sustainability of an idiosyncratic resource's competitive advantage is derived from its rare, causally ambiguous, and highly interconnected nature, this does not mean that members of the dyad cannot form structurally similar product alliance arrangements with other firms. However, the specifics of market-oriented alliances vary, making this idiosyncratic resource difficult to duplicate precisely. Therefore, a sustainable competitive advantage may result from an alliance's market orientation efforts.

H1: AMO positively influences (a) NP novelty and (b) NP meaningfulness.



By developing novel and meaningful products, market-oriented alliances will differentiate themselves from their close competitors and, thereby, improve their positional advantages over them. This way, they will likely to increase their NP performance. Therefore,

H2 (a): NP novelty positively influences NP performance.

H2 (b): NP meaningfulness positively influences NP performance.

### **Antecedents of AMO**

*Joint top management support.* AMO is an idiosyncratic, relational resource that must be managed through focused commitment and the assignment of dedicated alliance managers. Top managers in the alliance provide a well crafted vision that communicates norms for market oriented behaviors and guidance for the type of knowledge to be formed. Hence, joint top management commitment to view the market as the *raison d'être* facilitates the formation and implementation of AMO ( Spekman et al. 1999).

H3: Joint top management support positively influences AMO.

*Goal congruence.* Goal congruence is the extent to which alliance partners perceive the possibility of simultaneous goal achievement (Jap 1999). As an idiosyncratic investment, AMO requires dedicated, collaborative effort from both side of the NP development alliance.

H4: Goal congruence positively influences AMO.

*Relational quality (Trust and Commitment).* Two of the most widely acknowledged social norms for governing and coordinating inter-organizational exchange are trust and commitment (Kale et al. 2000). Trust is the degree of confidence that partners have in the reliability and integrity of each other, and commitment is the belief that ongoing relationship between alliance partners is so important as to warrant maximum efforts at maintaining it. Thus, when these two norms exist, partners have the belief that they will not act opportunistically.

H5 (a): Trust positively influences AMO.

H5 (b): Commitment positively influences AMO.

Both trust and commitment are the *sine quo non* of relational exchanges. Although both factors influence the quality of the relational exchange, the sequence of these factors is essential to successful collaboration. Trust is formed at early stages of the relational exchange (Dwyer et al. 1987) and, thereby, is effective at reducing uncertainty and ambiguity at these stages.

H6: Trust positively influences commitment.

## **METHOD**

### **Research Context and Key Respondents**

The empirical context for this study includes high-tech companies from several industries: biosciences (e.g, pharmaceuticals, biotechnology, and biopharmaceutical), semiconductors, electronics, hardware, software, and medical equipments. Our study uses a cross-sectional, survey design. The unit of analysis throughout the study is two-firm NP alliances. Although the unit of analysis is the dyad and measures are based on mutual and joint understanding of inter-organizational relationship between partners, data are gathered from a single informant from one firm in each alliance (please see the sampling procedure for the reasons provided).

### **Sampling procedure**

The sampling frame for the final field survey consisted of 962 firms who participate in dyadic NP development alliances. To enhance the response rate, one of the authors personally called each of the 962 key respondents in the sampling frame to solicit their participation in an online survey. After we sent the online surveys, we received complete responses from 216 executives. Since the unit of analysis is the dyad, we attempted to gather data from both partners in each alliance. Therefore, we personally contacted the 216 executives, underlined the importance of dyadic data in the study, and requested permission to contact their partners. Of the 216 executives, only 53 would provide the contact information of their partners. The remaining respondents (N=163) provided reasons for not being able to assist us. The most common concerns were nondisclosure agreements between the partners and governmental, anti-trust regulations.

Partner companies were personally telephoned by one of the authors and told that their partner had provided us with their contact information. Of the 53 partner firms, we received 30 complete responses. Since this sample size is too small to measure the structural model, we decided to merge the second set of data (N=30) with the first set (N=216), yielding a final sample size of 246. We also tested the structural model before (N=216) and after merging two data sets (N=246). There was no statistically significant difference between two models' path coefficients. The annual sales of the sample frame ranged from \$500K to 100+ billion. The mean sales was \$4.4 billion.

### **Alliance Market Orientation Measure Development**

AMO was conceptualized to specify the construct domain and to generate items for its components. AMO is conceptualized as having three components (inter-organizational customer orientation- IoCustor, inter-organizational competitor orientation- IoCompdor, and inter-organizational coordination- IoCoor). The literature review provided us with 17 measurement items in total. We administered the 17 item questionnaire to a test pool of 22 alliance managers. AMO scale items were tested for reliability and validity based on internal consistency (e.g., Cronbach Alpha, item-to-total correlation, and qualitative responses from the follow up interviews with 22 executives). These tests indicated the existence and importance of the three dimensions of AMO.

*Control variables.* To prevent model misspecification error, to control for potential confounding effects, and to provide alternative explanations for our hypotheses, two control variables are included in the study: market density (MD) and technology density (TD).

## **ANALYSIS AND FINDINGS**

We evaluated measurement properties by running two CFA's. First, we examine the three dimensional structure of the focal construct of AMO. Subsequently, since our sample size meets the five-to-one ratio of sample size to parameter estimates requirement we proceeded to fit a CFA on the overall model that included the focal construct and other nine constructs (JTMS, GC, trust, COMM, NPN, NPM, NPP, MD, and TD).

*The AMO construct.* AMO is conceptualized as a second-order reflective construct with three dimensions. Each dimension is first-order reflective measured through their respective indicators. In order to verify whether three underlying dimensions converge into one, we examine the chi square difference between a measurement model with perfect correlation and the other with freely estimated correlation. Results show that AMO has three distinct, latent dimensions ( $\Delta \chi^2 = 63.20$ ,  $\Delta$  d.f.= 3,  $p < .001$ ).

*Combined measurement model.* The estimation of the confirmatory measurement model should come before the simultaneous estimation of the measurement and structural submodels. This two step approach helps to assure the measurement model and thereby, avoid interpretational confounding and possible interaction of the measurement and structural model. Raykov's reliability, also called composite reliability, measures the shared variance among the set of observed variables used as indicators of

latent variables. The composite reliability values for all twelve constructs ranged from .77 to .95, well above the acceptable cutoff value of .70.

The measurement model exhibited a good fit, which is above recommended standards [ $\chi^2 = 2237.85$  ( $p < .05$ ) d.f.=1364; RMSEA= .04; CFI= .97; RFI= .93; IFI=.97]. The standardized factor loadings ranged from .66 to .92 and were all statistically significant at the  $\alpha = .05$  level. Significant loadings and high composite reliability values demonstrate that all latent constructs have convergent validity. In addition, all the path coefficients between the second order construct AMO and its three first order dimensions (IoCustor, IoCompor, IoCoor) are significant at the  $\alpha = .05$  level (AMO IoCustor,  $\gamma = .69$ ; AMO IoCompor,  $\gamma = .61$ ,  $t = 6.37$ ; AMO IoCoor,  $\gamma = .73$ ;  $t = 7.61$  ).

We examined discriminant validity by using two procedures. First, we computed the square root of the average variance extracted values (AVE) by the indicators corresponding to each of the twelve factors and compared it with the highest correlation that each factor shared with the other factors in the measurement model. The square root of AVEs for each factor was always greater than the highest shared correlation. Although this discriminant validity test is considered rigorous, we also conducted another procedure. In this procedure, chi square values of unconstrained models (each pair of latent constructs covaries freely) are compared to the chi square values of constrained models (correlation values for each pair of latent constructs are constrained to one). Each time, unconstrained models' chi square values are less than the constrained models' chi square values. The two procedures provide evidence of discriminant validity of our measures.

### **Common Method Variance (CMV)**

We gathered the data from a single respondent in each NP development alliance at a single point in time, which suggests a possible error due to common method variance. We conducted two separate tests of CMV bias. First, we used Harmon's one factor test to measure whether a single latent factor would account for all the manifest variables. We find that the single factor model did not fit the data well ( $\chi^2$  value of 6516.76 [d.f.= 1431],  $p < .05$ ; RMSEA= .16, CFI= .85; RFI= .81; IFI=.85). We conducted a  $\chi^2$  difference test against the hypothesized twelve factor model to assess the impact of CMV. The result shows that there is a significant difference between the  $\chi^2$  values of the two models. One-factor model is significantly

worse than the twelve-factor model ( $\Delta \chi^2 = 4278.91$ ,  $\Delta \text{d.f.} = 67$ ,  $p < .001$ ). Thus, we conclude that there is no general factor that accounts for most of the covariance among the latent constructs, mitigating concerns of potential of CMV bias.

Second, we used a procedure called “marker variable assessment technique” Specifically, this approach entails identifying a marker variable that is theoretically unrelated to at least one other variable in the study, measuring its smallest correlation coefficient with the study’s theoretical predictors, partialling out this correlation from all bivariate correlations, and comparing the partialled results with the unadjusted correlations among the predictors and outcomes. We conducted this analysis using competitive density as a marker variable because it is theoretically unrelated to study’s predictors and outcome variables. Results show that partial correlations among the constructs in the measurement model are significant even after we partial out the effect of CMV. Further, we conducted a 95 % sensitivity analysis to validate the result. Collectively, the results of these two tests suggest that CMV does not pose a serious threat to the interpretation of the results from this study.

## **The Structural Model**

Before we tested the hypotheses, we examined a correlation matrix for the latent constructs. The bivariate correlations are all significant and have the expected signs. There is also variability in the latent construct measures, as reflected by the means and standard deviations.

Since the model examines the causal ordering of antecedents and consequences of AMO simultaneously, structural equation modeling (SEM) with maximum likelihood (ML) estimation is chosen as an appropriate analysis method. For the final analysis, the data collected from the final field survey has a total of 246 respondents. Although the appropriate sample size issue in SEM is open for debate, it is generally agreed that sample size greater than 200 provides stable results.

The estimation results from the measurement model confirm that all the measure items are measuring their underlying constructs without any interpretational confounding. Since there was no problem with interpretational confounding, we performed simultaneous estimation of structural and measurement model in Lisrel 8.8. The main effects model

tests structural links among AMO's antecedents, consequences, and control variables. Figure 1 shows the model used to test the main effects.

First, we examine the overall model fit. Although the chi-square statistic ( $\chi^2 = 2035.42, p < .05, d.f. = 1112$ ) is significant due to the sensitivity of the sample size, all base line indices (NFI=.94; CFI=.97; IFI=.97; RFI=.93) and RMSEA (.06) support the view that there is an acceptable agreement with the covariance matrix. Second, we find that AMO is positively associated with NP novelty ( $\beta = .51, p < .05$ ) and NP meaningfulness ( $\beta = .53, p < .05$ ), in support of *H1 (a)* and *H1 (b)*. *H2 (a)*, which predicted a higher NP performance for novel products, was supported ( $\beta = .17, p > .05$ ). In support of *H2 (b)*, NP performance was positively associated with NP meaningfulness ( $\beta = .32; p < .05$ ). *H3*, which predicted that joint top management support would lead to superior AMO, was supported ( $\gamma = .26, p < .05$ ). In support of *H4*, goal congruence was positively associated with AMO ( $\gamma = .41, p < .05$ ). In support of *H5 (a)* and *H5 (b)*, trust and commitment were positively associated with AMO ( $\gamma = .23, p < .05$  for trust;  $\beta = .21, p < .05$  for commitment). Finally, in support of *H6*, trust was positively associated with commitment ( $\gamma = .58, p < .05$ ). Overall, all of the proposed hypotheses tested in the structural model are supported.

Finally, we reassessed the model with two control variables: market density and technology density. Overall, we found that, NP performance is positively influenced by technology density ( $\gamma = .19, p < .05$ ). However, the causal relationship between market density and NP performance does not hold ( $\gamma = .14, p > .05$ ).

## DISCUSSION

A core message of this study is that the complexities of NP development alliances require them to consider focusing more on developing outside-in capabilities. We conceptualize this through the concept of alliance market orientation (AMO). We draw on R-A theory to extend our understanding of the AMO concept. We advance the notion that AMO is an idiosyncratic resource. An important issue in our research involves the key central role of AMO in alliances' NP creativity and performance. Our results imply that AMO has, indeed, a key role in boosting NP alliances' outcomes.

Another message of our study is the role of relational quality in developing AMO. In general, the results indicate that relational quality between partner firms positively impacts on AMO, which fosters the flow of the collective

market information generation, dissemination, and responsiveness. Our results caution NP development alliance managers to maintain a market focus. Our results indeed indicate that relational harmony (commitment and trust) influences successful NP alliance outcomes *through* the collective market oriented behaviors of alliance partners.

For goal congruence, evidence indicates that it is strongly associated with the development of AMO. As goals become increasingly aligned, there is a strong incentive to develop an inter-organizational market orientation program. Consider an example from a successful technology alliance between AT&T and Intel. Both companies shared a similar vision for the technology progress in intelligent networks and, therefore, saw the possibility of a common goal accomplishment – to make it more convenient and cheaper for customers to get everything from basic phone service and wireless broadband to HDTV quality communication. As put by the CEOs of both companies, their relationship is a disruptive partnership, whose success requires a common goal setting to meet the market needs.

An important finding from this study is that joint top management support seems highly important for developing AMO. Because the top management team is the conceptualizer of alliance strategy, it plays a tremendous role in shaping alliance's values and orientation. AMO is an idiosyncratic investment that requires special care from the top managers of the alliance partners.

Consider, now, the consequences of AMO. According to findings, AMO seems to be an important factor in terms of both the magnitude and the consistency of its effects. AMO strongly influences both dimensions of NP creativity -- NP novelty and NP meaningfulness. Our results support the view that closely monitoring market needs and trends, being keenly aware of competitors' actions and offerings, and the intense inter-organizational coordination, integration, and synchronization of alliance NP development activities result in providing customers with products they had not even imagined. Indeed, one of the alliance executives in our sample indicated that having a common understanding about their market helped them develop a "bifocal" vision, which eventually turned into creative products and enviable performance results.

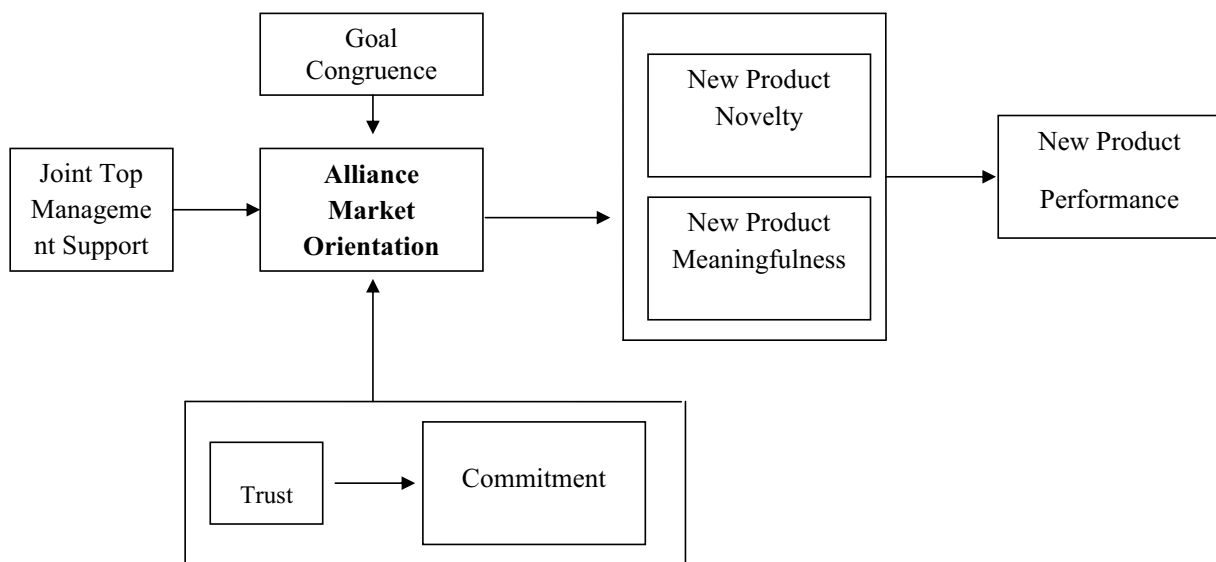
Finally, our findings show that both NP meaningfulness and NP novelty positively influence the alliance NP performance in terms of top-line (e.g., relative market share and sales), bottom-line (e.g., ROI and profitability), and qualitative objective outcomes (e.g., customer satisfaction and overall performance). However, at the same time, whereas NP novelty had a

positive contribution to alliance NP performance, it had less effect on NP performance, when compared to NP meaningfulness. In other words, our findings suggest that alliance NP performance is driven more by increases in valuable and meaningful attributes of new products than by novel ones.

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**FIGURE 1**

**Alliance Market Orientation Model of New Product Creativity and Performance**

# Co-creating a new research landscaping service for a library: utilizing the “correspondent” mode in customer integration

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## ABSTRACT

*Customer involvement is becoming a must for organizations when they innovate new services. However, we know much less about customer integration in new service than in new product development. In this research we apply a service-dominant-logic based customer integration approach, where the customers are involved as “correspondents” – being in a real-life, value creating service situation when piloting the service. The case organization of our research is Aalto University Library, and the new service co-created together with customers and other stakeholders is a research landscaping service for doctoral students. In this study we report our findings from the co-creation endeavor. The goal is to increase understanding on stakeholder integration in service innovation.*

## KEYWORDS

*Service innovation, Co-creation, Customer integration, Science mapping, Visualization*

## INTRODUCTION

Customer involvement is becoming increasingly important for innovating new or improved services. Such concepts as *customer co-creation* (Prahalad and Ramaswamy, 2004, Gustafsson et al., 2012), *open innovation* (Chesbrough, 2003, 2011), *user innovation* (von Hippel, 1986, 2005), *community based innovation* (Füller et al., 2006, Bragge et al., 2009) and *crowdsourcing* (Brabham, 2008, Estellés-Arolas and Gonzáles-Ladrón-de-Guevara, 2012) have all recently received intense interest by service businesses and public organizations.

However, service organizations are facing a challenging task: how to choose an appropriate method for their customer involving innovation endeavors. Although research on service innovation and new service development (NSD) is already abundant (see Papastathopoulou and Hultink, 2012 for a review), Chesbrough (2011) claims that we know much less about how to innovate in services than about how to develop new products and technologies, and this poses a key problem for advanced economies. He suspects that the customer may need to participate throughout the innovation process, as tacit knowledge, which emerges during the innovation process, cannot be collected in advance. This may partially be explained by the nature of services, as the users have a more prominent, interactive role in the actual service provision (Menor et al., 2002).

Toivonen and Tuominen (2009) define service innovation as follows:

“A service innovation is a new service or such a renewal of an existing service which is put into practice and which provides benefit to the organization that has developed it; the benefit usually derives from the added value that the renewal provides to the customers. “

Accordingly, the process of service innovation is the process through which the renewals are achieved (ibid.). Bitner et al. (2008) state that those organizations, who prepare and move systematically through a set of planned stages succeed best in providing new services. The amount of stages in systematic service innovation (or NSD) processes depends on the type of service and organization. For example Alam (2002) lists altogether 10 common stages: strategic planning; idea generation; idea screening; business analysis; formation of cross-functional team; service design and process/system design; personnel training; service testing and pilot run; test marketing and commercialization. Customers may contribute in almost all of these stages, although they most commonly participate in the idea generation and screening stages, and next in the service design, service testing, test marketing and commercialization stages (Alam, 2002).

In this research we depict how Aalto University Library involved customers and also other relevant stakeholders when co-creating a new research landscaping service for doctoral students. The library aims at delivering the latest research results, via offering to its customers over 50.000 scientific e-journals through various databases. Although superb in terms of coverage, the magnitude poses also challenges for researchers. The new service is aimed to complement the library's existing 1-hour information retrieval (IR) kick-off session for the doctoral students, which has been offered as a service since 2002. Research landscaping, on its part, utilizes contemporary text-mining and science visualization tools, and their application is

becoming a must for researchers tackling with the exploding amounts of literature in electronic science databases (Porter et al., 2002, Cobo et al., 2011, Sunikka and Bragge, 2012). Besides the target customers of the service, also a senior researcher and a recently graduated doctoral student, both being early adopters of research landscaping tools, have been invited in this service innovation project as stakeholders by the library. The goal of this research is to increase understanding on customer and stakeholder involvement in service innovation through an approach that is founded on the service-dominant logic (Vargo and Lusch, 2004, 2008).

The remainder of this paper is structured as follows. In section 2 we will portray relevant earlier literature to frame the theoretical background for the research. Thereafter, we describe our methodology in more detail. Section 4 depicts the research findings, and Section 5 concludes the paper.

## THEORETICAL BACKGROUND

Edvardsson et al. (2012) have recently constructed an insightful framework that can be used as a decision tool for choosing between appropriate customer integration methods in service innovation. Their framework is anchored in the service-dominant logic (SDL) of Vargo and Lusch (2004, 2008). The SDL suggests that use situations are critical for understanding value creation and that customers should be involved in service development. The customer integration framework depicts a matrix of four modes based on the information related to the use situation (either *in situ* or *ex situ*) and the resource contexts (either in context or ex context) that are available to the customer (see Picture 1).

Besides informing how customer integration can be carried out, the research of Edvardsson et al. (2012) enlightens also why and when companies should integrate customers in service innovation. They report that much of the information used in service innovation practice comes from customers who are not in the service situation (they are thus *ex situ*) or do not necessarily have an actual need for service, but who have previous experience from the service's resource context (they are thus in context). The information is thus coming from customers that report "ex situ-in context", reflecting from the armchair a previous service experience ("the reflective practitioner" mode in Picture 1). However, Edvardsson et al. (2012) state that those methods that allow users to identify their own needs and solutions - and which are also obtained in the natural use context - are most likely better at providing influential information regarding the preconditions for better value creation in service. This "correspondent"

mode consists of methods where the participant reports live from the service situation (“*in situ*–in context”). It has more seldom been employed in service innovation (Ainasoja et al., 2010, Edvardsson et al., 2012), and also research is scarce from this mode (Bragge, 2013).

		Use situation (activities and interactions at a specific situation)	
		In situ	Ex situ
Resource context (resource constellations available to the customer)	In context	<b>THE CORRESPONDENT,</b> reporting live from the situation ➤ Empathic design, lead-user method, CUDIT method	<b>THE REFLECTIVE PRACTITIONER,</b> reporting from the armchair ➤ Participatory design, toolkit for user innovation, living labs, customer group involvement, conversational approach
	Ex context	<b>THE TESTER,</b> reporting from the virtual heaven ➤ Information acceleration, avatar-based innovation	<b>THE DREAMER,</b> the creative who generates wild and imaginative ideas ➤ TRIZ method, free elicitation, GAP-based Quality Function Deployment

**Picture 1 Framework for relating use information to methods for service development with method examples in each mode. Source: Adapted from Edvardsson et al. (2012)**

Several methods are available for customer integration or involvement when innovating new services. Many of the methods are utilized especially in the “fuzzy front-end” of innovation, that is, in the early phases of the process. Picture 1 presents several customer integration methods used in service development, based on the study of Edvardsson et al. (2012). The methods in Picture 1 are divided into a quadrant based on the use situation and resource context. For example, the correspondent mode includes methods such as empathic design (Leonard and Rayport, 1997) and the lead-user method (von Hippel, 1986). A correspondent is a customer who is in or has experience in a real service context and who is in or just about to enter a real-life, value-creating situation. Edvardsson et al. (2012) suggest that the correspondent mode methods are excellent for capturing live data regarding use value experience and service failure. Via employing correspondents the aim of this research is to test and pilot run a new research landscaping service for doctoral students. We will describe our methodology and data in more detail next.

## METHODOLOGY

### Case organization and background for the new service

Our case organization is Aalto University Library, and especially its campus unit at the School of Business (Aalto BIZ). The business school is located in downtown Helsinki, Finland, and it was originally founded in 1911. Its

library (previously known as the Helecon Information Center) has for long been the leading research library of economic sciences in the country, and it is well known for its extensive collections and supply of multi-channel services, also for external customers. In order to support the university's research strategy the library at Aalto BIZ has since 2002 offered personal and tailored information retrieval (IR) kick-off sessions for master's thesis workers as well as for doctoral and post-doc researchers. During 2006-2012 on average 116 Master's students and 8 researchers have yearly participated in these kick-off sessions.

The IR kick-off service was brainstormed and formulated internally by the library personnel, and it was swiftly taken into real use and gradually modified to its current form based on user feedback received (Lankinen, 2004). The aim of the service is that the customer can after participating in it independently utilize the information sources offered by the library when conducting (thesis) research. The main process for the service has remained the same for several years. It starts when the customer requests an appointment to meet an information specialist, typically via a web form, where the customer gives information on her/his study background, specific research topic and on previous experience with the library's online resources. The 1-hour session is then held on the date agreed in a dedicated and tranquil IR kickoff room, where the customer is placed hands-on in front of the computer, guided by the information specialist sitting next to the customer. The session ends with gathering feedback via a web form, for continuous improvement of the service.

In order for the library to stay at the forefront with its IR service offerings, the Chief Librarian (CL) has for several years been harvesting the field for advanced science mapping and visualization tools that would be suitable for the needs of doctoral and post-doc researchers. The impulse for this was given around 2007 when she was introduced to the patent landscaping tools utilized by VTT (Technical Research Centre of Finland) for technological intelligence (see e.g. Ruotsalainen, 2008). Impressed by the capabilities of patent visualization, she brought up the need for similar tools for science literature vendors at the European Business School Librarians' Group meetings, with vague response at the time. However, the Dean of the business school responded positively to the idea of establishing a "research landscaping" service for researchers, and the CL kept on exploring the possibilities. In 2008, she participated together with one of the library's Information Specialists (co-authoring this research) to a research seminar where the first author presented her ongoing research on enriching large-scale literature reviews with text-mining and visualization tools (Bragge et

al., 2012). The seminar strengthened the CL's presumptions that simpler and more affordable tools would be needed for research landscaping purposes than the sophisticated full-scale text-mining tools used by bibliometric researchers (see a recent comparison in Cobo et al., 2011).

Finally, it turned out that VTT had similar needs regarding science visualization in their organization and that marked the beginning of several knowledge exchange roundtables with their Knowledge Solution Unit's Head and Business Development Manager. The CL invited both the first author and the Information Specialist to these regular roundtable meetings. For example, joint demonstration webinars were organized to evaluate the capabilities of Elsevier's SciVal products in visualization. In Fall 2012, Aalto University Library confirmed in its annual result negotiations that information visualization is one of its development projects. As part of that endeavor the Information Specialist was commissioned late 2012 to conduct a feasibility study on the multitude of possible tools available for science visualization. Many of these tools are currently free of charge or inbuilt to the databases already subscribed by the library.

Early 2013 the library decided to proceed with the development of the new service by involving doctoral students from the Information and Service Economy department into the innovation process. The Information Specialist and the first author (having previous experience also from user-centered research) had relatively free hands in designing how to implement the customer involvement in the innovation process. The cross-functional team for this research was at this stage complemented with the IT Account Manager for the library, having herself previous experience from science visualization during her doctoral studies in 2006-2010.

## Method and data

Based on the feasibility study conducted by the Information Specialist and joint discussions within the cross-functional research team the service process was initially sketched in April 2013. The purpose of the research landscaping service was formulated as follows: "After participating in the guidance session the customer can independently utilize the comprehensive citation databases and analysis and visualization capabilities of relevant tools in conducting research". Two specific tools were selected to be utilized in the service: *Scopus* by Elsevier and *VOSviewer* developed by van Eck and Waltman (2010). The tools are naturally subject to change along with future developments in the field that need to be followed regularly. The Scopus is already subscribed in the library (being the most searched citation database there in 2011-12), and it has recently been revised to include visual and very

user-friendly *Analyze results* options. In addition, Elsevier has opened the application programming interface for its products and Scopus currently includes also tens of third-party developed applications that automatically visualize various aspects of literature search results (such as co-author networks or title word clouds). VOSviewer is a versatile and free tool meant for the visualization of similarities and it works also without installation, launched directly in a web browser. It can be used to create maps of keywords based on a co-occurrence network, or maps of publications, authors or journals based on a co-citation network. It can be used together with literature data exported from Scopus or from Web of Science.

We decided to utilize the lead-user method (von Hippel, 1986), inviting doctoral students from the department of Information and Service Economy (ISE) at the Aalto BIZ as the correspondents for the service testing and pilot run stage. ISE students are all familiar with managing and analyzing the rapidly growing supply of information and new technologies, although none of the invited ISE correspondents had previous experience from research visualization practice, *per se*. However, four earlier ISE doctoral students have utilized advanced text-mining and visualization tools (notably [www.thevantagepoint.com](http://www.thevantagepoint.com)) in various phases of their studies (Bragge et al., 2007, Bragge and Storgårds, 2007, Leone et al., 2012, Sunikka and Bragge, 2012). They have all collaborated with the senior researcher in the department (the first author), who has been an early adopter of these science visualization methods in conducting large-scale literature reviews, that is, in *research profiling* (cf. Porter et al, 2002). This service innovation case represents thus also an exemplar of transferring an early-adopter-instigated practice to a service provider in keen collaboration with relevant co-creating stakeholders. The latest developments and free accessibility of various text-mining and visualization tools from niche expert users to each and everyone have finally made this possible.

Our data consists of four 1-hour service testing/pilot run sessions that were held individually for each correspondent at the IR kick-off room in the library, during April-May 2013. The conduct of the research landscaping sessions followed exactly the outline of how the service is to be delivered for doctoral students, representing thus a genuine and live service situation, whose contents were tailored to each correspondent's research topic. However, besides the Information Specialist, also the first author of this paper was present in all sessions as an ethnographic observer writing electronic notes and as an advisor pinpointing issues important especially from a researcher's point of view. All sessions were audio-recorded with the consent of the correspondents. Feedback from the process was gathered



throughout the sessions as it emerged and also immediately after the guidance session ended. Also written feedback was asked via a web form just like after the IR guidance sessions.

## FINDINGS

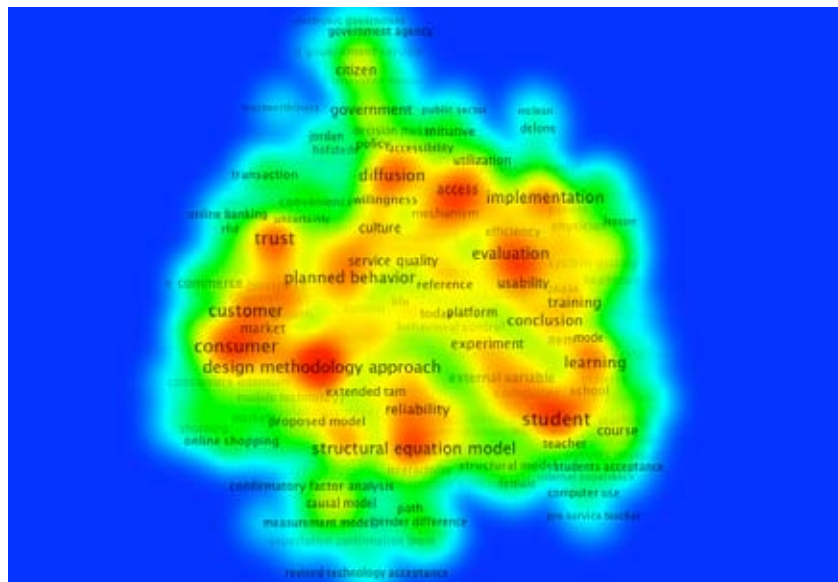
In this section we present our findings. First, we discuss the key issues that surfaced owing to involving the correspondents, and then, we portray the benefits of the cross-functional team established for this research.

All of the correspondents agreed fully that the new service is definitely useful for doctoral students; from novice to more advanced students. The service was even suggested to be included in the first-term orientation studies of doctoral students. As we had both first-year and advanced students as our correspondents, we were able to discern slight differences in their demands. Although none of students had used the Scopus database regularly before, it appeared that due to the citation databases' unfamiliar interface it is more difficult for a novice researcher to conceive the whole and embrace all options presented in a short time.

In order to save time, we asked the correspondents to register to Scopus before the sessions. Based on the feedback, it could be a good idea to ask them also to conduct a short topic search task with Scopus beforehand for them to better get acquainted with the database and its user interface. Furthermore, supplementary paper instructions with step-by-step screenshots are needed as support material (and for possible note taking) for some students already during the session and for all students after the session. Otherwise the new analysis and visualization practices will not be assimilated and taken into regular use after the 1-hour guidance.

One correspondent emphasized that when marketing the service to the busy doctoral students it is very important to explicate the benefits of the research visualizations. For example, how the visualizations enable researchers to understand the structure of complex networks revealing hidden relationships by making them visible, or to find research gaps, trends and hot research topics. This could be accomplished, for example, by presenting a few illustrative visuals (see example in Picture 2) in the service brochure, and describing their potential benefits for a researcher. That way the researcher would be better equipped to what is to be expected, and get the most out of the guidance session. Advice for producing the marketing material could be taken from the interactive example maps portrayed at the VOSviewer site (<http://www.vosviewer.com/maps/>).

Looking in retrospect the paths that have led to the development of the research landscaping service, it is evident that the project has benefited from the cross-functional team that has participated in the co-creation of the service. It is more difficult for library personnel to fully understand the process of conducting academic research, although they most have personal experience from doing a Master's thesis. Thus, an expert researcher's perspective was beneficial both in general, and when interpreting the topic-based landscapes. The other way round, as the field of science mapping and visualization has progressed so rapidly during the last few years, it would not have been possible to suggest the most suitable tools for the service without the extensive feasibility study conducted by the library's Information Specialist.

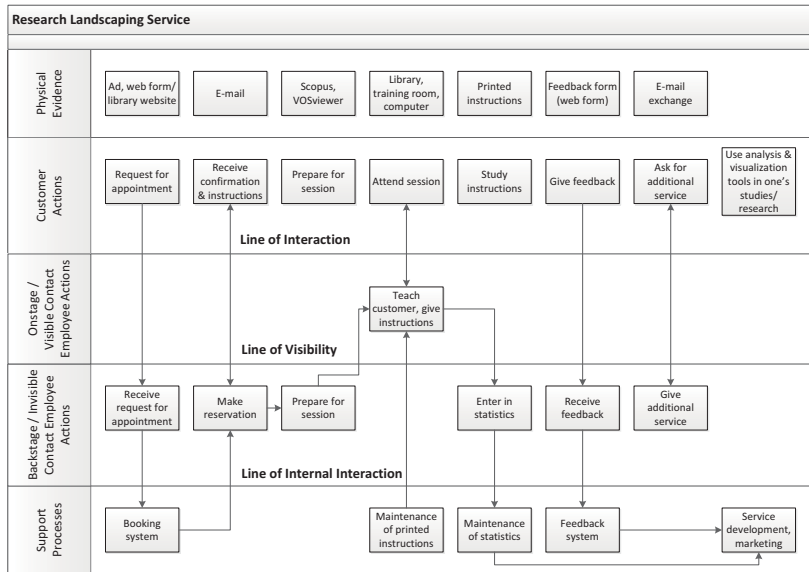


**Picture 2** An example of a research landscape created using VOSviewer on “Technology Acceptance Model” (with over 2200 search results from Scopus)

The tools for research landscaping were selected together, and it was also extremely critical to learn collaboratively to use the new VOSviewer tool. There is a manual, but some very basic information is missing from it, such as which is the recommended file format for creating maps with Scopus files. We explored the otherwise easy-to-use tool with a trial-and-error method, and exchanged our findings with each other.

As a result of our co-creation research, we have outlined a service blueprint for the research landscaping service (Picture 3). Service blueprinting is a process analysis methodology originally proposed by Shostack (1982, 1984). Zeithaml et al. (2006) define service blueprinting as a tool for simultaneously depicting the service process, the points of customer

contact, and the evidence of the service particularly from the customer's point of view. With this description, the authors emphasize the different systemic layers overlapping in a service, from the layer of customer interaction and physical evidence to the layer of internal interaction within the service production process.



**Picture 3 Process depiction of the new research landscaping service**

There are still some open issues, besides marketing the service, which need to be resolved before launching the service in Fall 2013. For example, training of VOSviewer and the session conduct to the other members of the library's Educational Services team. This needs to be done so that the research landscaping session may be conducted by several Information Specialists, and also transferred to the other two units of the Aalto University Library.

## CONCLUSIONS

Aalto University has recently declared a charter for its Service Development Program for 2013-15. One of the program's key principles pinpoints that in order to lift research and education to an outstanding level internationally, higher and wider requirements are set to services supporting the core activities of the university. Furthermore, continuous capability development is demanded from the service personnel. The program's strategic objective is two-fold: 1) to develop Aalto services to become a catalyst for world-class academic work, and 2) to use the services to strengthen Aalto's competitive advantage/edge. Regarding the program's

customer-related objective, the aim is to move towards a customer-driven operating model, which includes defining customer segments/profiles and identifying their needs, rethinking what services will be needed, and developing high-quality and modern services based on customer needs. The research that we have presented in this paper instantiates fully the ideas behind the service development program charter. We hope that our study also serves as an exemplar of how to involve customers also other relevant stakeholders in new service development initiatives at the university.

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# Collaboration and contracts in Integrated Project Delivery – Exploring the roles of owners and architects

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## ABSTRACT

*This paper presents an initial look at the deeper effects of contract structure on collaboration on construction projects, especially related to how owners and architects behave differently under integrated project delivery (IPD) contracts. Using a mixed method of interviews and shared file logs it was found that an IPD project with a multi-party contract had the owner being relatively less involved in the project, and the architect being more active during the build phase than the design phase, compared to the IPD project with traditional separate contracts. Knowing these effects will lead to better understanding what type of contract an owner should adopt and how it affects the role of the architect on the project.*

## KEYWORDS

*collaboration, contracts, integrated project delivery (IPD), construction industry*

## INTRODUCTION

An increasing need to understand and promote integration exists in construction projects due to increasing complexity of buildings, high fragmentation of the industry, inadequate collaboration, and poor productivity (Barlow 2000; Dulaimi et al. 2002). Integrated Project Delivery (IPD) has been developed by sophisticated owners to tackle these issues by using different levels of integration mechanisms on a project that span from the typical project to a full IPD project with a multi-party contract sharing risks and profits (National Association of State Facilities

2010). IPD projects have a set of criteria that the AIA California Council (2007) states can be used to increase the probability of success, but the real influences of these criteria are not thoroughly investigated. In addition, the role of contract in IPD projects is not well understood. Construction projects involve multiple organizations from different disciplines. The owner has a central role in commissioning and achieving a successful project; another central participant is the architect. We study collaboration on IPD projects with different contracts and approach the phenomenon by examining the role of owners and architects.

## THEORETICAL BACKGROUND

The construction industry is known to struggle with keeping the projects on time and on budget. The industry itself is project-based which creates discontinuity and hinders collaboration. The complexity of the construction industry influences operations to focus on individual projects, the use of standardized components, local adjustments and the multiple roles played by firms (Dubois and Gadde 2002). Three different collaborative forms of project delivery have been developed to increase collaboration and effectiveness in construction projects. These forms are project partnering, project alliance, and integrated project delivery (IPD) (Lahdenperä 2012). IPD is the newest form and most popular in North America (Ghassemi and Beceric-Gerber 2011).

The project owner decides the project delivery method. This decision concerns project characteristics and needs and preferences of the owner (Al Khalil 2002). The contract dictates the project delivery. Some evidence exists that collaborative contracting has positive impact on team performance (Forgues and Koskela 2009). IPD projects have also other differentiating factors than the contract. Altogether six factors characterize IPD projects and lead to their success: (1) a multi-party contract, (2) early involvement of key participants, (3) collaborative decision making, (4) shared risks and rewards, (5) liability waivers, and (6) jointly developed project goals (Ghassemi and Beceric-Gerber 2011). Shared risks and rewards, for example, can mean financial incentives linked to project outcome to promote collaboration and best-for-the-project thinking. IPD projects have different mechanisms for collaboration because the motivation cannot be dictated only by contracts (Bresnen and Marshall 2000). In fact, collaboration should be improved through relationships rather than contracts between project stakeholders (Kent & Beceric-Gerber 2010). However, collaboration is not easy to organize in interorganizational projects because in addition to project interests, organizations have their

own specific interests (Leufkens and Noorderhaven 2011). In this study, we define collaboration as high-level process that includes also coordination and teamwork between project stakeholders (Bedwell et al. 2012). We need to understand better the phenomenon of IPD and collaboration in construction projects to be able to affect the efficiency of the project.

This paper offers new insight about the IPD, contracts and collaboration. We study how the role of the owner and the architect in the project team differs in two IPD case projects with different contracts. The contract does not dictate the performance in the project but gives some guidance. Previous studies have been done more on alliance projects (e.g. Davis and Love 2011), but IPD projects with wider collaborative methods are less studied.

## METHODOLOGY AND DATA

We studied two IPD hospital construction projects, Project A and B, in North America in the fall 2012 with a mixed method of qualitative and quantitative approach. We wanted to understand how our findings from qualitative data are supported in the quantitative file usage data between companies. In order to understand the dynamics of different IPD contracts, we chose two contractually different cases; one with a multi-party contract and one without a multi-party contract.

### **Case descriptions**

Project A had a 12-party Integrated Form of Agreement (IFOA). The 12 partners were the owner, architect, general contractor, structural engineer, mechanical engineer, electrical engineer, structural steel trade contractor, mechanical trade contractor, plumbing trade contractor, electrical trade contractor, medical gas trade contractor and fire protection trade contractor. The project team was partially co-located in a project big room which was a small shared trailer on an extremely tight lot. The owner, general contractor and trade contractors were working in the trailer full time, whereas the architect, and structural, mechanical and electrical engineers were co-located two to three days a week or when needed. In addition to 12 IFOA partners, there were 26 other companies involved in the project.

Project B did not have a multi-party contract but adopted several integrative mechanisms characterizing IPD. During the design development phase the project team started working fully co-located in a project big room which was a large shared trailer that included the owner, construction



manager, architect, general contractor, MEP (mechanical, electrical, plumbing) trade contractors and MEP engineers, 29 companies in total. The general contractor was the same company on both projects. Table 1 describes the case projects with different IPD characteristics defined by Ghassemi and Beceric-Gerber (2011).

**Table 1: IPD characteristics of the case projects**

	Multi-party contract	Early involvement of key participants	Collaborative decision making	Shared risks and rewards	Liability waivers	Jointly developed project goals
Project A	12 parties	Yes	Yes	Yes	Yes	Yes
Project B	No	Yes	Yes	Only contractors	No	Yes

### **Qualitative data – Interviews and observations**

We collected the qualitative data in fall 2012. We stayed three weeks on each project site interviewing the key project stakeholders and observing the work in the project big room. Both projects were well into the construction phase at the time of data collection. We conducted altogether 72 thematic semi-structured interviews of key project stakeholders; 31 interviews from Project A and 41 from Project B. The interviews focused on topics including collaboration, information flow, IPD, hierarchy, software tools, organization, and problems. Interviews lasted from 15 to 90 minutes. All interviews were audio-recorded and later transcribed into text totaling 2609 minutes of recordings and 735 pages of transcriptions. We used observations to understand the dynamics between different organizations. We attended meetings and observed the work in the big room in general.

### **Quantitative data – File usage**

The quantitative data consists of a dataset of all read and write information from the file sharing system that the general contractor uses to coordinate file versions and official job documentation. All involved parties used this file system to store official documents. This file system creates a log file for each file that includes information about who is using the system, what they are doing, and when. Using this information we can determine who is reading which files and who is editing which files. The file logs used in this study represent system usage from January 2009 to December 2012 for altogether 2109 users from 24 different projects (including Project A and B). There are 6,557,871 log entries that describe activity of 571,433 files. Each log entry includes exact project, path, timestamp, username, user description, filename, action ID, and version. The username includes a

prefix with an organizational ID that indicates the company that the user is affiliated with. The action ID tells what the user did, including “viewed,” “created,” “Updated,” “checked-in, changed,” “checked-in, not changed,” “deleted,” and “uploaded.” These action IDs are sorted into “Write” and “Read” actions to easily distill how users are interacting with the files.

## Data analysis

With the mixed method of qualitative and quantitative approach we had a following data analysis process. First, the transcribed interviews were read line by line by coding all the quotes relating to contract or contractual influences on the project. This resulted in 103 quotes on Project A and 33 quotes on Project B. These quotes were further synthesized into propositions that were then examined with the quantitative file usage data. To demonstrate the organizational interactions in file usage data, the following basic metric was used in file log data:

OrganizationX.userX Writes File 1 at Time1. OrganizationY.userY Reads OR Writes File 1 at Time2.

➔ An interaction is counted between Organization X and Y.

OrganizationX.userX Writes File 2 at Time 1. OrganizationX.userZ Reads OR Writes File 2 at Time2.

➔ An interaction is counted for Organization X with itself.

To demonstrate the organizational activity in file usage data, each file log entry by a member of the organization was counted as an activity in the following way:

OrganizationX.userX writes File 1. OrganizationY.userY reads File 2.

➔ These two logged events would result in one activity by OrganizationX and one by Organization Y being counted.

Finally, the results from quantitative file usage data were further interpreted based on qualitative data.

## FINDINGS

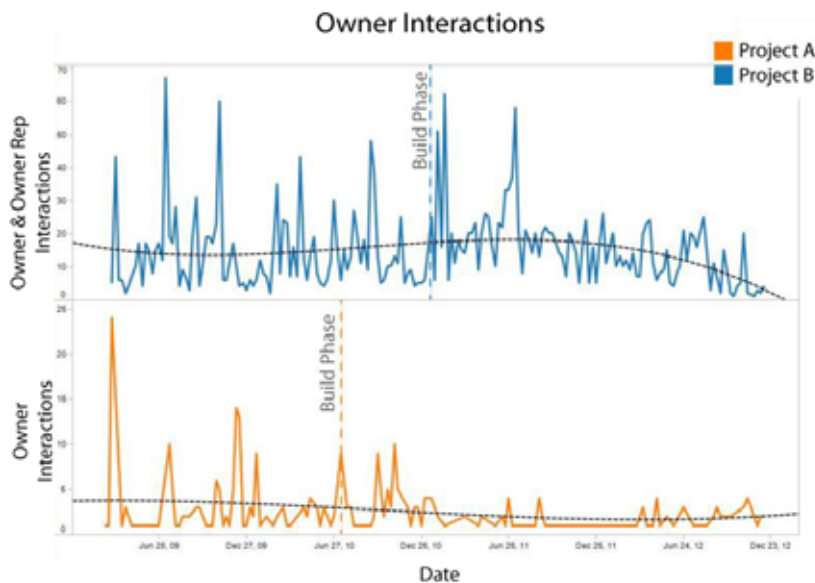
Based on combined qualitative and quantitative data analysis, the case projects revealed two significant differences in interaction and activity of (1) owner and (2) architect. The findings related to these are discussed in the following.

## Owner interaction

On both projects, the owner representatives were fully co-located in project big rooms. On Project A, the owner managed the project with in-house resources, whereas on Project B, the owner hired a construction management company to assist in managing the project. In the data analysis, both the owner and construction manager were considered as representatives of the owner on Project B. Based on the interviews, some stakeholders suggested that the owner was less involved on Project A with IFOA than on a conventional contract. On a conventional contract the owner would often referee the conflicts between the architect and contractors, whereas on Project A with IFOA, after mutually setting up the target price the owner would step back and let the IFOA partners to deliver the project as agreed. The inspector of record described this in the following way:

“Another anomaly that I have noticed is that the owner is also just removed from the process. Because they are like, you guys just figure it out. Nothing is going to cost me anymore money unless I change it. Because you are all partners. Whatever you did not like about whatever somebody else did, do not talk to me. Figure it out.” (Inspector of record, Project A)

When looking at the owner interactions from the file usage perspective, there are clear differences between the projects. Figure 1 shows the weekly activity of the owner representatives on Project A and B.



**Figure 1: Weekly activity of the owners on both projects**

The owner at Project B continues to be active, and perform different operations on files in the system throughout the project. The owner interaction at Project A with IFOA, however, begins to flatten out after build phase starts, and months go by before the owner interacts with the system at all. This is in line with the suggestion that the owner on Project A would step back and let the IFOA partners to deliver the project as agreed.

However, the owner at Project A provides a somewhat conflicting perspective in which the owner is actually more involved in the project. Co-locating with others in the project big room, the owner understands the project a lot better through detailed and daily discussions. And these discussions do not show in the file usage data. The owner explains the situation as follows:

“As the owner, you definitely understand the project a lot in more detail. Because the questions of it. The stuff that the team is asking for is detailed. Whereas in the past, you probably relied a little bit more on your architect. But now your architects and your contractor equals.” (Owner, Project A)

Interestingly, the general contractor at Project B is in line with this perspective and refers to the owner at Project A being more involved and stronger leader in their projects. At the same time, however, the general contractor suggests that an IPD project with traditional separate contracts requires stronger leadership from the owner than a project with an IFOA. The general contractor describes the dynamics in the following:

“And then it’s just having [the owner at Project B] take the lead and manage the situation a little better. So for our other projects of [the owner at Project A] is another one... they’re very strong in just being the leader. We will do this, we’re going to do this, we’re going to take the lead on this and they pull everybody. With us, if the owner doesn’t take that role, especially with our contracts are... well you are telling me to do it but I don’t work for you. So us and the designers get off a little bit... so it would definitely be encouraging or almost demanding the owner to take the lead and drive the team, that’s one of the roles they have.” (General contractor, Project B)

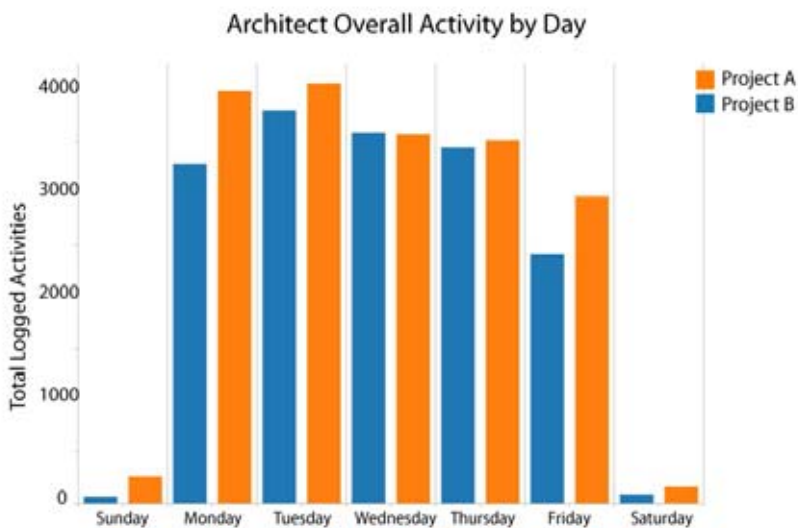
Each side of the story and the data logs indicate that the owner is more knowledgeable of Project A, but is not needed for disputes or the kind of detailed investigation that requires reviewing files by any of the contractors. This suggests that on an IFOA project, the owner can be less involved during the build phase and let the team resolve issues without owner intervention.

## Architect activity

There were differences with architects co-locating with the rest of the project teams on the investigated projects. On Project A with IFOA, the architect was partially co-located in the project big room, usually three days a week from Tuesday to Thursday. On Project B, the architect was fully co-located in the project big room since the design development phase. Based on the interviews, the partial co-location on Project A worked generally well even though many of the contractors would have wanted architects in the big room full time. The general contractor described the issue in the following way:

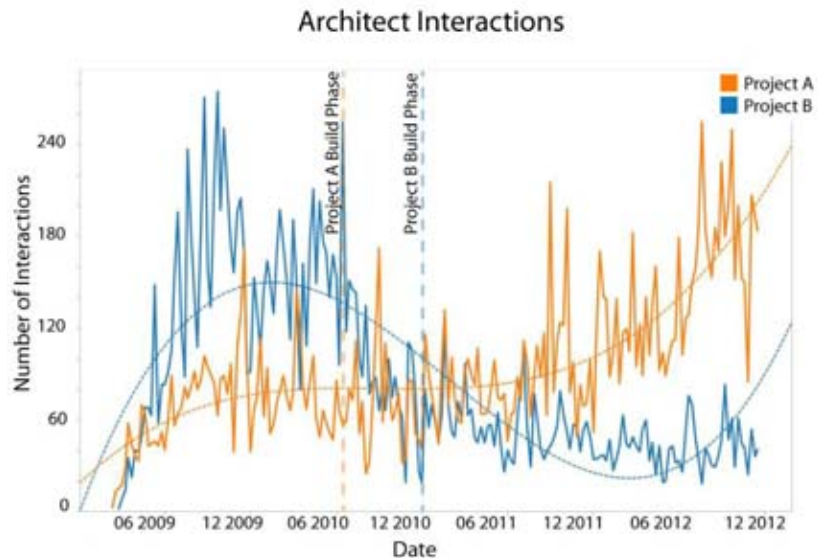
“I think them being an equal partner to the IFOA that they should be here full time because we have questions full time. I mean, if everyone being here makes things better, it would only be better if the design team was here... You’ve seen that on big room days. When everyone is here we get so much more done. So, we should just multiply that by five days and I think it would be better.” (General contractor, Project A)

On the other hand on Project B, the architects had difficulties in finding time to concentrate and do design work in distracting co-located settings. Often overtime work was needed to get the actual work done. From this perspective, partial co-location gives architects more time to do individual work. When looking at daily architect activity from the file usage perspective, there are no clear differences between the projects. Figure 2 shows the daily activity of the architects on Project A and B.



**Figure 2: Overall activity by day of the architects on both projects**

There is slightly more overall file activity during Mondays and Fridays on Project A with partial co-location (these were the days that the architect was mostly not co-located with the rest of the project team) but the differences are not significant. However, when looking at weekly architect interactions over the whole project, significant differences between the projects can be seen. Figure 3 shows the weekly interactions of the architects on Project A and B.



**Figure 3: Weekly interactions of the architects on both projects**

The architect on Project A is clearly more interactive with the files after the build phase begins. This is opposite of the architect at Project B, who is very interactive with the files during the design phase, but then moves into more of a sustaining role. These differences in trends of file interactions can be explained at least partly by the differences in contracts. The trend on Project B follows the traditional contracting roles of the architect; leading design in the design phase and changing to construction administration in the build phase. On Project A, the trend is rising and the architect is interacting more with files in the build phase as they want to make sure that the end product will meet the requirements both financially and architecturally. They have more control over the actual planning and execution through the shared knowledge and shared power of the IFOA contract. The architect explains this in the following way:

“Maybe there wouldn’t be as attention to questioning why we’re doing things because we as the architects look, we’ve got money riding out here that when we pull through contingency which you can see on the board that’s money coming out of our pocket. We’re not guaranteed that money so we’re a little bit more

critical about how that happens and about decisions made... So if it wasn't an IFOA project we probably wouldn't have that additional level or layer of oversight to really watch the dollars and cents." (Architect, Project A)

The general contractor gives another perspective to explain the trend of the architect file interaction on Project A. In an IFOA project, the roles get blended; the general contractor and trade contractors are more involved in the design, especially the detailed design, which changes the role of the architect in the project. The general contractor described the issue as follows:

"The role of who is required to do what gets very blended... In [IFOA], there's much more overlap... [Contractors] end up actually taking on more of a role of a designer... The designers become more reviewers and less designers, and it pushes more of the design effort onto the trades and the building trades which is a good thing. But it also allows designers to have less focus on everything needing to be perfect and less attention to detail, because if it's wrong then you know we are more likely to bring it up." (General contractor, Project A)

The IFOA has a huge effect on how the architect is involved with the project over time. The partial co-location did not seem to affect the architect activity from the file usage perspective in these projects but the interviews suggested that there are effects that do not show in file usage. Full co-location of the architects makes the collaboration more effective from the project perspective, but the individual work of the architects is less productive because of distractions. Project A shows the architect with much less activity in the design phase, which indicates letting the contractors and partners blending design roles. Project B shows the architect very active during the design phase and transitioning into a more sustaining role for the project.

## CONCLUSIONS

This paper examined the roles of owners and architects on IPD projects with different contract structures. The findings reveal that an IPD project with a multi-party contract (IFOA) had the owner being relatively less involved in the project, and the architect being more active during the build phase than the design phase, compared to the IPD project with traditional separate contracts. These findings indicate that there are differences in owner interaction and architect activity between IFOA and non-IFOA IPD projects. This is only the beginning of research into these projects that begins to uncover deeper effects of contract structure on the roles of different project stakeholders. Knowing these effects will lead to better understanding on what type of contract an owner should adopt.

Only some of the findings from Project A and B are presented in this paper. Additional work is needed in comparing the findings to other IFOA and non-IFOA projects to obtain a sufficient sample size for generalization. The file usage data is also limited only to interactions and activity on the official file documentation system, which means face-to-face interactions and other file sharing methods (such as email) are excluded from the analysis. However, the links between qualitative and quantitative data in this paper show that these differences grew from the contract structure, so owners can better understand how choosing an IFOA will impact their own role, and the role of an architect on the project.

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# Elements for Modeling a Co-Creative Agent

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## ABSTRACT

*The aim of this paper is to promote discussion of the skills and qualities of a Co-creative Agent, in order to identify desirable elements and attitudes to start promoting the knowledge and contexts that will model the new designers who can drive this active role in the projects. This elements could work in addition to applying existing methodologies and may lead processes of co-creation promoting social structures necessary for optimal development of a new approach of design. The method used to frame these elements and start modeling the Co-creative Agent proposal, is a combination of notes from different readings which mention the collaborative, co-design and co-creation approach, both in theory and practice -mainly co-design reports in the area of health and patient centered design- Without having the intention to concentrate the effort of this work in shaping a stereotype of the Agent, I believe that the discussion of the elements that model a Co-creative Agent will allow the inclusion of holistic and transdisciplinary perspectives that encourage behavioral change and new course of projects that reflects the training received by the professionals involved building it.*

## KEYWORDS

*co-create, agent, patient-centered*

## INTRODUCTION

Co-create has become a topic of growing interest in the last decade or so. Its antecedents can be located in the concepts like 'Participatory Design' which roots as Alastair Fuad-Luke refers comes from the labor movements in Scandinavia in the 1950's (Fuad-Luke 2007). This perspective boomed in

the late 1960's and 1970's with very particular echo in the Built Environment and in the Community Planning and Placemaking.

Scholars Prahalad and Venkat Ramaswamy bring out another influential approach in their 2000 Harvard Business Review article, "Co-Opting Customer Competence"(Prahalad & Ramaswamy 2000) that later was expanded in their book "The Future of Competition: Co-creating Unique Value With Customers". As Leslie Speer also mentions they introduced co-creation, or the idea of it, and it introduced readers to different ways of engaging with customers in the product development process (Speer 2008). As they mention "The interaction between the firm and the consumer is becoming the locus of value creation and value extraction. As value shifts to experiences, the market is becoming a forum for conversation and interactions between consumers, consumer communities, and firm" (Prahalad & Ramaswamy 2004). The shift from the perception of consumers buying products and services as transactions (passive), to the one of relations that becomes part of the experience (active). Seems to go beyond the description of a trend of jointly creating products, as a result value will be increasingly co-created.

In the review conducted for the construction of theoretical framework remained clear that there are several terms used to refer the vision of co-creation. As referred by Margolin "...the terminology has diversified since then to embrace 'collaborative design', 'cooperative design', 'co-design' and social design' " (Margolin & Margolin 2002). User centered design, human centered design (HCD), transformation design, empathic design, co-production and co-option are also terms related with the co-creation approach.

### **Similarities and Differences**

Just as there are similarities to what these terms refer, they are also subtle but significant differences between the practices relating to them.

The more significant is about the core values related to the field of origin of the term. On one hand we can identify an approach that comes from the marketing field, as in the case of the work of Prahalad & Ramaswamy referred before. The other approach concerns about a process of social empowerment related to public policy. As the following reference exemplify "Co-design is a commitment regarding inclusion and power, as it contest dominant hierarchically oriented top-down power structures; it requires mutual learning between stakeholders/actors..." (Fuad-Luke 2009). This approach in the design fields tends be more strongly aligned with

sustainability as a societal ambition that can only be achieved by collaboration that contrast with single procedure or ingredient idea.

Despite that and other differences, both seemingly antagonistic perspectives coincide in the next statements:

- The knowledge may come from different sources (disciplines, stakeholders, actors) to create value.
- Participants in a collaborative process usually engage with the result.
- Regardless of the platform selected, the process gets a benefit from the networks, whether real or virtual, that occur between the different actors and stakeholders.
- Co-creation, in its pure form, is just what it sounds like – making something together. (Speer 2008)

### **Phases and Participation**

In this regard there is a variety of positions on the subject. Some authors mention that the collaboration should be from the beginning to the end of the process, while for others it co-creation regardless of whether participation is in one or more stages of the process. For example co-creation may be in development as the case of open software, may be through research or approach with users through qualitative research methods, as advisors when giving feedback of a schema or prototype, can occur through the customization of products as in cars or through project financing as crowdfunding.

As we can see co-create is about identifying needs, develop a product or service jointly and/or support the implementation of the strategy. Apparently the differentiation in the form and duration of the collaboration depends on the platforms and the interest of the developer to reach the goal.

### **CO-CREATE AGENCY**

In the overall picture already presented about co-creation is remarkable that most of the articles reviewed highlight the virtues and importance of implementing collaboration in processes. Most of them also make significant reference about the methodology available to achieve co-creation. Ethnography, Anthropology and Qualitative Research skills, both for investigation and development are constantly suggested, therefore it is not surprising that IDEO is the most quoted work reference. But little is

said about the roles and interactions between stakeholders and actors needed to work together, there is lack of information about it, and it seems to be a relevant issue, because that agency is fundamental for co-creation.

The method used to frame the elements and start modeling the Co-creative Agent proposal, is a combination of readings that mention the collaborative, co-design and co-creation approach, both in theory and practice -mainly co-design reports in the area of health and patient centered design-. In order to detect the exposed and ideal qualities, and relations that are evident in practice reports so that some desirable characteristics can be identified and grouped in topics.

What is patient-centered approach? Why may it be relevant?

As one of the Six Aims for Improvement, the IOM (Institute of Medicine) defines patient-centered care as: " providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions."(Committee on Quality of Health Care in America, Institute of Medicine 2001)

"In the broadest terms, patient-centered care is care organized around the patient. It is a model in which providers partner with patients and families to identify and satisfy the full range of patient needs and preferences. Not to be overlooked in defining patient-centered care is its concurrent focus on staff. To succeed, a patient-centered approach must also address the staff experience, as staff's ability and inclination to effectively care for patients is unquestionably compromised if they do not feel cared for themselves."(Frampton et al. 2008)

The idea of making the cross-reference between patient centered and co-creation came from Richard Buchanan's paper about design research because he argues that "clinical research is, as the name suggest, directed toward an individual case...". (Buchanan 2001). The field of Health and Medical has extensive experience in performing this type of research, therefore the constant relation of theory and practice implied in reports could give a new perspective of co-creation and may lead to revealing insights about the interaction agency.

### **Some insights**

- In the Guide presented by Planetree & Picker Institute, they settle that the patient-centered care in an organizational culture change, "...characterized not by discrete programs, but by the core values and attitudes behind the implementation of such programs". (Frampton et al. 2008) They also point out that in this cultural

transformation requires buy-in and engagement from all levels of the organization in a long-term commitment, a shift of mindset.

- As we could imagine, introducing changes requires a host of considerations, that is why people may feel apprehensive or skeptic to adopt the patient centered approach, in order to clarify the most common misconceptions they decide to cited, them as myths.
- In order to achieve successful results, Plan for Real and The King's Fund agree on the importance community engagement, with an enfassis in the engagement of the staff as crucial as the senior management.
- Perform an initial meeting to get familiarized. This meeting is a training workshop with the community so they could to understand the process to be followed. (Anon n.d.) This meeting could serve to make a diagnosis to detect the possibilities of working with the community. Considering organizational culture as a fundamental part of the success of the projects, since a very top-down structure may differ with the collaborative vision.
- The co-creation process is not new, in developing and emerging regions of the world already exist know-how, because their context allows them to engage because of a deep notion of community. It could be necessary encourage this thought before starting work.
- The fifth myth says "Patient-centered care can only be truly effective in a small, independent hospital."(Frampton et al. 2008) With a direct reference to the dimension of the organization also applied to the objective, the suggestion is to the suggestion is to face it by planning stages as part of the big goal.
- Make info visible. Most of the methodology and tools emphasize the use of prototypes, visible notes in brainstorming, models and cards with notes to make information visible so that we can identify patterns and relations.
- Keep the team informed all the time of the progress of the project and the results of the stages, even those who are not in the direct participation in all the process.
- The conflict of opinions is usually one of the main challenges, so we must learn to mediate, so that the differences may not be personal. In that way we can work with heterogeneous participants with divergent views to build consensus.

- Confidentiality. One approach is related to the security and confidence for participants to share information without being exhibited or exposed, you should take into account the condition of anonymity and prevent participants feel uncomfortable. Another approach to confidentiality is through the concern of the brands or organizations because sensitive information can be filtered.
- Clear rules. Applied to explain in what degree and what kind of dynamic, define functions and roles of each participant, establishing sanctions, behavioral codes, work and communication platforms and if necessary express their doubts and disagreements.
- A prominent suggestion, is considering working with an existing group, it could be a patient support group, a neighborhood committee or an NGO already established. This precedes the group dynamics which are knowledge and confidence and certain working mechanisms.
- Simple things make the experience. Keep in mind the holistic approach of the project, giving importance to the outcome of the process rather than imposing a vision.

As we can see most of the insights that have been mentioned refer to situations related with management, communication and organizational culture which indicates the concern given to this topics in the practical approach.

### **Co-Creation is a team effort**

Working with different people gives us the advantage of having multiple levels of experience, opinions and multidisciplinary approach, diversity enriches our frames and knowledge because all members of the heterogeneous team have something valuable to contribute.

The following categories of members of the community of the patient-centered approach used as references that will help us to characterize the different profiles involved in the process as an effort to understand the dynamics that happen in the team.

- Project sponsors
- Staff: nurses, doctors or even other working force within the organization.
- Community: patients and families, service beneficiaries.
- Volunteers: social operators

- Senior Management and Board of Directors

The relationships that exist between them are varied and depends on the interest and platforms that have been agreed by the various roles that plays on the team.

Unlike traditional teams, in the process of co-creation suggest that hierarchies are omitted so you can create an atmosphere of trust and community, which is necessary to promote a horizontal structure .. However, as mentioned earlier most of the references are for management, administration and planning are recurrent, previously characterized the profiles does not distinguish who performs that work. In this ambiguity is where the proposal of the Agency as the entity with leadership, share destination and influence toward solution. The one that takes "action".

## CO-CREATE AGENT

According to the analysis of the research on different processes, strategies and examples where mention is made on co-creation, there seems to be a concern about the Agent, which is not implicitly mentioned in any of the texts, but is inferred through their functions, its scope, its activities and responsibilities. The lack of clarity of this team member and the uncertainty of its figure, let us not only misunderstand their origin but also provides ambiguity in the role it plays in the co-creation process. Through the functions performed and which are referred in the insight already described, the following proposal is shaped.

Agent arises when generating a correlation between the different stakeholders and actors, in direct relation to the context situations and surroundings, next to the need -demand/opportunity- that has been detected and to which the various stakeholders such as institutions, political representatives, staff of the organization, users and the community, recognizes a possibility of change for treatment.

Therefore, at an early stage the agent emerges as an "identity" formed by the conglomeration of intentions and contributions of the various scopes that show interest in the care of a need, defined not by an individual but by a group, a community and encouraged to add effort to create a synergy of action context to generate a shift to the need identified.

The agent as identity actually bound intentions and efforts to achieve a common good. It is an entity in which the actors and stakeholders reflect their values, intentions and purposes that characterize features of the



collective through building a favorable situation to implement a different action, a stock exchange.

Therefore, the agent as identity is a principle which validate the interest, benefits and values that allow the formation of a team of co-creation and the approach of a common goal.

Once the quality or condition of the agent as identity begins, the step of action and reaction for which the agent endowed with high moral quality provided by the community through its various actors, is assumed as the "entity" responsible for advisor, guide, order and structure to the various efforts that will translate in the generation of strategies, actions and commitments to achieve the resolution of the need initially raised.

The agent, understood in a second stage as an entity, continues to maintain the spirit of the group because the reason for its existence transformation of the need expressed by the community. Therefore the agent (entity) arise according to the planning, control mechanisms, the appropriate methodology, as well as the tools and available resources to develop a collaborative process to bring down the need of the community as a representation derived from the agent as identity.

Implicitly determines that the agent as entity participate in more than one stage of the process, have a deep knowledge of the tools and conditions that will be used, is necessarily allied to different stakeholders and actors, so can mediating different interests, promoting the involvement and co-creators motivation, is capable of defining the stages of intervention and promoting assertive communication during the process in order to define not only operational issues but the correct transmission of the context, the ideas and the resulting proposal.

The agent conceived as identity and entity, emerges directly from the Latin term *agentia*, referring to the action as the activity that takes effect and promotes change. This change or shift as mentioned is the product of several dynamic situations present in the context and the sum of the will of the actors, so the agent comes in proper condition and its profile is shaped by the collective, to have action effect, mobilization, which in turn exerts collective leadership.

In this sense, the agent not only takes the position of facilitator, but the one that promotes action and serves as a guide to ensure that the process take the direction of common benefit, regardless of whether the developmental profile of the co-creation occurs in the field of social or commercial. By identify the main role of the Agent not as a single subject but as collective

identity and a representative entity, is an attempt to characterize it to determine its role within the processes of co-creation.

## CONCLUSIONS

While it is still vague the understanding of the interactions necessary for the success of co-creation processes. The proposal for the characterization of an Agent, aims to encourage discussion of both the content and the dynamics intangible which act as promoters of synergies and are leading co-creation processes.

Trying to express the interactions, will allow us to understand the issues related to human relations, information flows and organizational cultures allowing the synergy of the community (agent as identity). As revised reports show they seem as important as they are the tools, the selection of the location and materials for managing good results.

The agent (as an entity) should be empathetic, good manager with great leadership, negotiation capacity all levels and desirably with knowledge of social sciences, anthropology and design, but most of all sill need to be capable of having at all times an understanding of the system structure, the big picture.

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# Participants or hijackers: Can co-design be co-designed?

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*Outside actors are increasingly active in the design of novel artefacts or better-suited experiences. While collaborative design (co-design) approaches are gaining more and more attention, its underlying principles, both theoretical and practical, remain to this date misunderstood and open to conflicting interpretations. Through non-participant observation and semi-structured interviews, and using Van de Ven and Poole's (1990) process theory, this paper investigates whether participants buy into a phase-by-phase design process or whether – and why – they chose to modify it at will, and gains first-hand insights on co-design phases, as they unfold in practice.*

*Co-design, process theory, design, innovation, collaboration*

Innovation and design are undergoing significant transformations. Decentralized, distributed, open: R&D departments and universal design principles are no longer ruling the development of new products and services. Whether we call them users (von Hippel, 1978), customers (Prahalad & Hamel, 1994) or novice (Glaser, 1985), outside actors are increasingly active in the design of novel artefacts or better-suited experiences. While user's design capabilities are nothing new – they have been the biggest innovators all along (von Hippel, 1978) – the current “empowerment” (e.g. Sundbo, 1996) by firms seeking to profit (not only in an economical way) draws attention.

Used well beyond the traditional boundaries of design, collaborative design (or co-design) allows for diverse bodies of knowledge to be purposefully coordinated, shared and integrated (Stewart & Hyysalo, 2008), while also enabling the perspectives of users to be factored in early on in the design process. However, while co-design is gaining more and more attention, its underlying principles, both theoretical and practical, remain to this date misunderstood and open to conflicting interpretations (Kleinsmann et al., 2007). Additionally, management and organizational theory has paid little

attention to this approach, failing to provide implications for what seems to be an important disruption in traditional design methods. In other words, we remain somewhat baffled by this democratization of innovation and design; what it is, where it comes from and what it means going forward. Hence, this paper aims to explore the dynamics of co-design from a process perspective in order and shed light on the following question: can co-design be co-designed?

Through non-participant observation and semi-structured interviews, and using Van de Ven and Poole's (1990) process theory, we seek to 1) investigate whether participants buy into a phase-by-phase design process or whether – and why – they chose to modify it at will, and 2) gain first-hand insights on co-design phases, both in terms of individual/collective and divergent/convergent dynamics, as they unfold in practice. Following a short review of the design literature, we introduce below our research methodology and experimental setting, discuss results and provide some practical and theoretical implications.

## **THEORETICAL BACKGROUND**

Organizations' renewed appetite for collaboration is in many ways a response to important changes in their competitive environment. Not only has the diffusion of information technologies has created better informed and more demanding customers (Foray, 2004), but it has by doing so redistributed the balance of power between the different stakeholders (Prahalad & Ramawamy, 2000). Additionally, the concept of value has experienced a major shift: what used to be valued yesterday by users is not the same as today. According to Gorz (2003), today's economy rests on non-material dimensions such as symbolic, societal aesthetic values. Hence, for a lot of organizations today, the move towards co-design or other "customer-active" approaches (von Hippel, 1978) is nothing but a necessary response to an attention-demanding crisis. When Stewart and Hyysaalo (2008: 298) argue that "the producer company (has) lost its position as the privileged source of innovation", we get a glimpse at the brutality of the awakening and the impetus for change experienced by some. Such changes have not only forced a lot of firms to reconsider their design paradigm, but have also given rise to new design theories and unique forms of collaborative design approaches (Hatchuel et al., 2011).

Collaborative design is also not a new concept; the practice of involving users, communities and a wide array of stakeholders in design has been around for many years. Already in the 70's, King et al. (1989) were hosting co-design

workshops in order to build a shared vision amongst citizens and to overcome public interest deadlocks, primarily by relying on designers' ability to represent multiple opinions. Several other approaches to involve users in design cohabit in the field, ranging from empathic design (e.g. Koskinen et al, 2003), user-centered design (e.g. Norman et Draper, 1986) participatory design (e.g. Schuler et Namioka, 1993), service design (e.g. Evenson, 2005) or contextual design (e.g. Wixon et al. 1990). For the purpose of this article, we shall simply define co-design as the collaborative work of designers, researchers and users (broadly speaking) in the design of novel solutions.

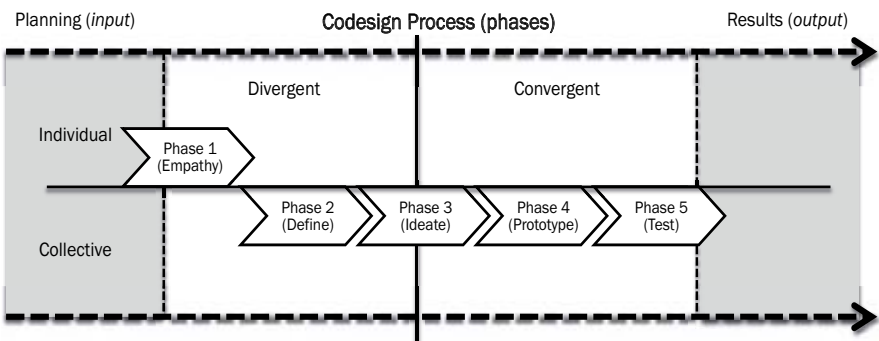
Although co-design and participatory design are often used as synonyms, especially in the Nordic countries (Mattelmäki & al., 2011; Sanders & Stappers 2008), we wish to move beyond often-semantic debates and only refer to co-design as being a facilitated and collective approach to creation, which relies heavily on participation, diversity, usages and prototyping. This also allows us to side step from more designer-centric articles that portray co-design as the work of professional (industrial) designers only and fail to depict what we believe to be a discipline-neutral approach. While these definitions may be different in nature, we argue that they all find their roots in a shared and overlapping understanding of what a collaborative design process ought to be.

Although some authors have offered representations of the design process in three (e.g Brown, 2009; Poulsen & Thogersen 2011; Jones, 1970; Fisher, 1998) or four (e.g. Sanders & al. 2010; Liedtka & Ogilvie, 2010) distinct steps, most favor a five phases approach. For instance, Stanford University's D.School (2010) model puts forth a process that unfolds as follows: *empathize, define, ideate, prototype* and *test*. In this model, the design process starts with observation of or direct encounters with users in an immersion phase. The resulting findings are then turned into an original point of view, where the underlying needs allow for the subsequent idea and concept generation to take place. The two remaining phases, namely prototype and test, are opportunities for designers to further shape their ideas into tangible artifacts and seek validation by end-users. Sanders and Stappers (2008) also suggest a five phases process: *setting the design criteria, generating ideas, generating concepts, prototyping* and *generating a final product*. In a 2005 Business Week article, the firm IDEO also sums up its approach in a five-phase model: *observation, brainstorming, rapid prototyping, refining* and *implementation*; whereas Martin and Harington (2012) introduce their readers to the phases of *planning, exploration, concept generation, evaluation* and *launching*.

Beyond singularities and distinctive dimensions of each of the above-mentioned “design-with-users” approaches, one fact remains: the field of design and the act of creation has been greatly de-sacralised by this democratisation of the practice. Today’s designers not only design for users, but increasingly design with them. Along the same lines, Hatchuel and al. (2011) have highlighted the profound changes in the discipline, which has moved away from the classical approach of merely responding to the demand of customers. Based on the literature review, it follows that 1) in spite of using different terminologies and phases, most (co) design or creation models share several commonalities; 2) yet, no single model creates a consensus amongst those involved in both the practical and theoretical side of design, and 3) that design literature is mostly left to practitioners and design firms alone, with only marginal input of other disciplines or of any academic nature. As a result, we know little about the process’s inner dynamics, and hence, have yet to develop solid management theory on co-design. More importantly, such representations often fail to pay close attention to the participants’ actual actions and their role in dictating the course of the process. What we have are mostly tools and methods-heavy, black-box accounts of co-design that dismiss this crucial interplay (Heiskanen & al, 2010). In this gap lies the foundation of our research question, which fuels our desire to investigate this process-participant dynamic further. However, what we do understand at this point is that co-design is a process comprised of individual and collective phases (Sanders & Stappers, 2008). Furthermore, in its simplest form, co-design phases alternate between divergent and convergent thinking episodes.

In order to plan and execute our experimental workshop, we opted for Stanford’s D School (2010) five-phase design process (empathize, define, ideate, prototype and test). Once again, it shall be reminded that our goal is not to find out whether this model actually works or not, but rather investigate its inner dynamics and assert whether participants follow any given sequence of phases as planned by the facilitator. According to Lubart (2001:295) “research on creativity from the process perspective, (...) defines creativity as the sequence of thoughts and actions that leads to novel, adaptive productions”. Hence, based on the literature, we suggest an phase-by-phase investigation of the co-design process based on the following constructs: *Phase 1 activities (empathize) are individual and divergent, Phase 2 activities (define) are collective and divergent, Phase 3 activities (ideate) are collective and*

*divergent, Phase 4 activities (prototype) are collective and convergent, Phase 5 activities (test) are collective and convergent.* Using these five constructs (figure 1) we chose to represent the co-design process as “a sequence of separable phases ordered in time and linked with transition routines to make adjustments between phases” (Van de Ven & Poole, 1990: 329). However, we elected not to investigate the process’ inflection points. Rather, the process-participant dynamics observed in this study are mostly comprised in the “during” part of the co-design process, or as Van de Ven and Poole put it, within “the proverbial ‘blackbox’ between inputs and outcomes” (1990: 214).



**Figure 1. Codesign as a collective/individual and divergent/convergent process**

## METHODOLOGY AND DATA

In this study, we opted for real-time process research combined with retrospective case research to effectively detect substantial changes in co-design activities (Leonard-Barton, 1990). Subsequently, we validated our observation data with participants’ perceptions and were able to explore in greater detail the interplay between the phases and their actual actions. Our research design draws heavily from Van de Ven and Poole’s (1990) methodology originally used to investigate innovation and change processes. Other authors have also analysed design activities using process models (e.g. Cross et al. 1996). Exploring the dynamics of co-design through this view allowed us to empirically address its complexities and take into account its evolution over time. In doing so, we aim to generate testable propositions about how divergent/convergent and individual/collective dimensions relate to co-design phases, as well as how participants engage (or not) in the process.

Sixty participants attended the workshop – our experimental setting – as part of a weeklong training on innovation and creativity management. Lasting three



hours, the workshop aimed at creating and testing concepts for a new creation hub in downtown Montreal. The participants, coming from various backgrounds and displaying a wide range in age, expertise and knowledge, were purposefully split into ten teams of six people. All of them were explained the sequence of activities, and provided indications on what each of the five phase consisted of. Moreover, every participant was provided with a handbook explaining the overall process. The transition between the phases and the time-keeping duties were under the responsibility of a single facilitator. Three of the groups were then randomly selected for non-participant observation, conducted by three different observers using a single observation protocol. Our data, consisting of 180 raw incidents, was then processed using a multi-coder strategy, reaching an acceptable initial interrater agreement rate of 0.82 (Neuendorf, 2002). Discrepancies in coding were agreed on following peer debriefing between the authors (Lincoln & Guba, 1985). After the workshop, two participants from each group were asked to provide us with their thoughts on their co-design experiment. In total, six interviews took place, all of which were conducted, audio recorded and transcribed by the lead author.

Our data indicate that team #1 did go through the two initial phases rather smoothly, although some temptations to skip ahead into the brainstorm and prototyping phases were also observed. The urgency to prototype early was felt by one respondent, who explained: “if we stood by the sequence, it’s only because it was forced down on us. I felt the need to jump right away to the fourth phase because I am a very ‘hands-on’ person”. However, the two subsequent phases are filled with out-of-place occurrences, rendering any decisive labeling quite difficult. For instance, participants in phase 3 did just as much phase 2 activities during that period of time. Phase 2 activities are also barely edged by phase 4 activities in the following bracket. Only the occurrences in the fifth phase are overall consistent with our constructs. Team #2 conducted their co-design in an orderly manner up to the fourth phase, where activities pertaining to all but one phase were observed. Lastly, the third team experienced a similar pattern, whereas phases 1,2,3 and 5 are somewhat consistent with our constructs, while phase 4 reveals several types of activities all at once. Yet, this very phase remains the most significant one for participants, who recognize the power of actually “doing” in a design process.

“This is not something I normally do: to do! (...) I enjoy asking prototyping specialists or actually do myself what I have in mind. Doing or at least being able to observe it from close distance; this is where the added value lies.”

Based on our data, it seems that most discrepancies occur towards the end or the beginning of a phase. In other words, participants tend to skip ahead or backtrack in the transition points of the process. Additionally, respondents were quick to point to the fuzziness of the process as the main hurdle they faced during the workshop. One of them was very blunt about it: “Frankly, I did not know what to do, yet I was feeling a lot of pressure. (...) In fact, I am not even sure the organizers knew what they were doing either”. Along the same lines, another participant added the following: “we were running in circles, *kinda* looking at each other. It was discouraging because we wanted to do well. We went on for a while like this, going from phases to phases, knowing our work was poor”. When asked whether they knew they were “stepping outside” of the original scenario, two respondents mentioned that they were aware, yet, that they did so in an almost “unconscious manner”. For instance, one of them admitted to have witnessed “constant back-and-forth between the phases (...) like circular patterns (done) in spite of themselves”. Amongst other difficulties, time was certainly a major annoyance. One participant vividly expressed his opinion on this constraint: “It was like a *coitus interruptus*, they gave us just enough time to adopt the process, but not enough time to fully experience it”. Lastly, co-design being a process built on knowledge diversity, interpersonal dynamics also added to the challenge of sticking to the workshop scenario. Judging from this comment, tensions were at times flying high:

“This was not codesign, this was fascist brainstorm. There was this girl on my team who did not want to prototype, she only wanted to write. I could not reach out to her. She convinced everyone on the team, and it resulted in a total failure. (...) I was stunned to see that 4 out of 6 people did not challenge her”.

Also reflecting on this issue, another participant pointed out to the lack of prior history between teammates and to the polite discussions as major inhibitors.

“I am not sure if it’s a matter of trust, but the climate was tense. It all depends on the people you are with. (...) It’s a nice activity to get to know people, but in the end, I realize how little we got done”.

Lastly, the theme of the workshop, the physical space and the animator were also seen, but only to a much lesser extent, as possible irritants in the process. On the other hand, no respondent expressed any particular recriminations about the process itself, but all of them did highlight the need for an additional

phase where a discussion on their experience and lessons learned could take place; a sort of reflexive wrap-up on their experience. One participant explained this desire as being “a post-mortem that enables the participants to individually come up with important take-aways”, while another one called this a mean “to discuss collectively about what happened, the limitations, good and bad moments” but even more so as a opportunity for them to vent out their frustrations “so that (they) don’t leave with those feelings inside”.

### **Individual/Collective Tracks**

Our data also show three important discrepancies in the individual/collective dynamics of team #1. Contrary to our constructs, its members proceeded to conduct the first phase in a collective manner, and prioritized individual work for the last two phases. Team #2 also chose to stick together during the empathy phase, a posture they then held for the entire duration of the workshop, with only six occurrences of individual actions in the last 150 minutes. However, this collective bonding did create tensions, as the respondent from team #2 expressed his dissatisfaction of continuously “going round the table, without having an occasion to debate or argue”. Finally, the third team stuck with the expected dynamics all the way up to the last phase, where the collective work gave way to an individual presentation. Only the first phase of the process shows several back-and-forth between individual and collective dynamics, something, it could be argued, to be expected from people sharing little to none prior connections. In fact, one of the participants stated that “early on, there is this shyness, we did not know for a few minutes who was going to take the lead. After a short while, this all occurred very organically”.

### **Divergent/Convergent Tracks**

Our data also reveal that the divergent/convergent evolution – the proverbial innovation funnel– was experienced by all three teams. In other words, participants explored a wide array of ideas in the early phases, gradually narrowed down to just a few and ultimately, developed a single proposition. Most of the discrepancies occurred in the fourth phase (prototype), where the expected convergent dynamic barely edges its divergent counterpart for both team #1 and #3. Such discrepancies are also noticeable, but in a lesser extent, during the third phase (ideate). One respondent from team #3, where divergent thinking lasted well into the fourth phase, provided this insight:

“We remained divergent until the end because there was no leader, no choices. It was like a holding company, six companies doing business under one label, except we did not have a CEO. This is where we failed; going round the table and expressing our ideas as equals (...) we needed a benevolent dictator”.

### **Co-occurrences within the Tracks**

The data gathered from phase one activities portray a sequence that is clearly divergent in terms of thinking, closely followed by the participants, but hardly individual in nature. Same goes for phase two, the only difference being that this one is meant to be collective in the first place. The issue with phase two, it seems, lies in the fact that it shows up in every four other phases across the board, meaning that the participants debate and redefine the problem at hand late into the process. In fact, this phase turned out to be very muddy for one team, as one of its members had this to say: “we got stuck in a mix of the first few phases for while, (...), it was very frustrating”. Phase three is, as expected, mostly collective and divergent in nature, yet punctuated with several occurrences of phase two questionings. The line between the two faces appears very fuzzy for at least two teams. When asked to describe this tension, one respondent mentioned that “in the second phase, we had this tendency to skip ahead. When we got to the third phase, we realized there were redundancies. This created confusion and demobilization for those who dislike repeating themselves”. Next, phase four does stand out as the most disgruntled sequence in the whole process. The numerous discrepancies between the observations and our initial propositions account for a phase where both individual/collective and divergent/convergent dimensions were highly debated, and where every other activities regardless of their intended place in the process show up. Finally, the fifth phase is convergent and mostly limited to activities pertaining to its intended purpose. It is however widely individual, an unexpected conclusion to a process mostly collective up to that point.

To sum up, only two of our five initial constructs turned out to be accurate. In other words, what we initially posited in terms of each phase’s dynamics based on the literature did not unfold as expected in practice. This reinforces the fact that co-design is an unpredictable endeavour, despite thorough pre-planning, guidelines and facilitators’ efforts to enforce a particular scenario. Additionally, rather than operating according to a typical convergent/divergent innovation funnel, we are faced with a creation process that looks a lot like an accordion; that is, made of a quick succession of openings and closings around a given

concept. Our results also indicate that most of the discrepancies occur in the transition points of the process. One possible explanation lies in the absence of actual “gates” and “gate-keepers” in co-design, the kind that we would normally find in typical innovation contexts. This suggests that teams experience considerable questioning, indecision and loops in the process when left with no intermediate checkpoints. More importantly, it points out to participants actually hijacking the process in an unexpected manner. While our quantified results support such thesis, our qualitative data depict a more subtle dynamic. Participants are certainly hijackers in the sense that they take control of the process, but not to the point of using it for their own purpose. They are individuals coping with a creation process that is fuzzy by nature, alongside people they hardly know. As such, indiscriminately calling participants hijackers would be unfair, while ignoring the several changes in this co-designed sequence of phases would be just as incoherent with our results.

## **FINDINGS**

This study suggests a few practical and theoretical contributions. First, we argue, based on our results, that all phases of the process are not created equal. We notice, for one, that the definition phase is the backbone of the co-design process and never really fades away; and, along the same lines, that the prototype phase triggers important validations that, in turn, create significant iterations in the process. Hence, we argue that these two phases act as accelerators, one being more conceptual and the other more practical. The definition and prototyping activities also become process disruptors, for the acceleration can go either way: backward to the redefinition of the very problem at hand, or forward into the validation of a solution. Knowing that the ultimate vision may only come before participants have started their work, and that planning-in-action tends to be more effective than pre-planning (Gevers, van Eerde & Rutte, 2001), practitioners may want to embrace this backtracking, or at least look the other way, rather than to indiscriminately enforce a workshop scenario. This relates to the notion of weak prescription (Hatchuel, 1996), which suggests that the role of innovation management should not be about setting all the goals, targets and objects, but rather about letting teams organize their work around a general orientation or common object. Put differently, practitioners should, at times and based on what the situation calls for, sit back and let the hijackers (mis) guide the process.

Lastly, practitioners should be prepared to act on the participants' desire for reflexivity. Devoting time for discussion and takeaways to be made explicit is a good way to move beyond the sort of production paradox (Carroll & Rosson, 1987), that is, a pressure to get results at the expense of learning, observed here. There may be a need for a meta-codesign where participants can, through a shared discourse, simultaneously improve on the process and on themselves as co-designers. We shall look no further than to our results to see this dual dynamic: respondents were critical of the phases and of themselves, while also very vocal about the negative and positive aspects of their experience.

As with any qualitative study, our results remain contingent to a wide array of factors, which we feel the need to highlight in this section. We have strived not for generalization, but instead have focused on providing a rich account of an internally consistent experiment that, we hope, can serve as the foundation for this study to be transferred in other settings. In such, our findings should not be seen as exhaustive, but rather as an exploratory and credible attempt to theorize a process that remains understudied. First of, it should be mentioned that many independent variables may be at play here, namely the theme, the animator, the teams and so on. Since such factors may play a role in the outcome of a co-design workshop, the extent of which is hard to ponder, future research should strive for experiments in controlled settings. Other studies could also focus on a succession of workshops, rather than a one-time event just like the one we observed here, providing participants with more time for them to adapt to the process. Finally, future studies of the phases of co-design may want to factor in the before (planning, goal setting, casting, etc.) and the after (the outcomes) of the workshop. They are in effect phases too, thus key in providing the field with more comprehensive portrayals of the whole process.

## **CONCLUSIONS**

The suggestion defended in these pages that process theory can shed light on co-design runs counter to process philosophers' (e.g. Nayak & Chia, 2011) representations of natural and social phenomenon. For we don't believe in the existence of a lone good way of co-designing, we find no incoherence in using this theory to posit co-design as a developmental process that allows for multiple progressions or pathways. From a common starting point, teams engage on divergent paths over time, and ultimately reach distinct endings.

This paper has provided a first exploration on the inner dynamics of co-design; yet, it did so by raising even more questions along the way. Our results have challenged –and dismissed– some of our early propositions on the phases and have also led us to suggest that such process is populated with hijackers; ambivalent participants who sometimes unknowingly co-design their way out of fuzziness and tensions that are inherent to creation. We do not seek to position a particular sequence as the go-to model for co-designers. In fact, such exercise would be very counter-productive. What we do however offer, as a closing remark, is a dual message. On the first hand, this study reinforces our belief that “laissez-faire” approaches in creation and design are, at best a dead-end, at worse a recipe for failure. Yet, on the other hand, this also call for practitioners and researchers to consider the possibility that their process may hold some flaws, and thus, to have some faith in the collective wisdom of co-designers and allow them to morph into ‘hijackers’ if the situation calls for it.

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# Strange Beasts: Exploring the evolution and anatomy of a national innovation system instrument

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## ABSTRACT

*This paper examines a national innovation policy instrument and presents an analysis of the history and rationale behind its inception. We argue that the design of this instrument has been focusing mainly on macro-level structures and the STI (Science, Technology and Innovation) mode of innovation, with micro-level collaborative processes and the DUI (Doing, Using and Interacting) mode of innovation being neglected. We call for a renewed focus on the co-creation of collaborative practices and the integration of both STI and DUI modes of innovation in the design of national innovation systems and instruments.*

## KEYWORDS

*National Innovation Systems, Innovation policy, Co-Creation, STI, DUI, Coopetition, SHOK, Finland*

## 1. BLIND SPOTS IN THE DESIGN OF NATIONAL INNOVATION SYSTEMS

Even though policy makers are not generally considered as the primary actors in co-creation and collaborative innovation processes, they do play a key role in creating the landscape and the environment where these activities occur. Their policies also channel considerable resources towards specific sectors, industries and research fields that are deemed strategically important at a given time. The instruments they create to funnel these resources are aimed at generating and stimulating innovative activity at the national or regional level. Ideally such instruments would take into account

the simultaneous demands of macro-level (regional systems, clusters, infrastructure) and micro-level (human interactions, collaborative practices, routines, learning) innovation processes (Freeman 1982/2004; Jensen et al 2007).

Jensen et al (2007) delineate two ideal types of learning and innovations. The first, the STI or science, technology and innovation mode, is about the production and use of codified scientific and technical knowledge. The second one, the DUI or doing, using and interacting mode, refers to an experience-based mode of learning. According to Lundvall (2007), shapers of innovation policy are biased towards the macro-level of innovation systems, focus on the STI mode of innovation, and favor high-tech industries over low-tech industries. Micro-level activities critical to innovation and the DUI mode of innovation are disregarded, even though they are equally important components of a well-rounded national innovation system. In fact the micro-level activities shape the macro-level, so an understanding of their dynamics is especially important when considering the formation of macro-level innovation instruments.

However, the logic of pooling resources, gaining critical mass, supporting clusters, securing locational advantage and geographical proximity (valleys, clusters, living labs) seem to hold a position of prevalence in the minds of policy makers. The design of innovation policy instruments is generally focusing on 1) channeling financial resources towards specific sectors, 2) the organization of proximities, especially geographic proximity often in the form of industry clusters, and 3) designing organizational hierarchies and systems to manage and control the resources invested into the sectors (special instruments, consortiums, organizations).

Micro-level collaborative activities are considered as a natural consequence of well-shaped macro-level interventions, especially organizational structures and rules of governance. There is a belief that structure will generate cooperation and innovative activity. The design of collaborative processes and management protocols for collaboration seems to be almost entirely forgotten.

## 2. THE CASE OF THE FINNISH SHOK INSTRUMENT

In this paper, we focus on a new national innovation policy instrument developed in Finland (SHOK, the Finnish acronym for Strategic Center for Science, Technology and Innovation). The SHOKs are new public-private partnerships of companies, universities and research organizations, organized into non-profit limited liability companies for long term research

collaboration to speed up innovation processes, to renew industry clusters and to create radical innovations. The SHOKs are aimed at being open innovation environments, carrying out research that has been jointly defined by its members in the SHOKs' programs' strategic research agendas. The creation of the SHOKs was meant to trigger exploration dynamics within an industry in order to increase its global competitiveness and efficiency, and enable the renewal of the sector. The rationale was that by giving resources, creating a critical mass of R&D investment, and creating a special organizational vehicle for cooperation at the pre-competitive stage, the SHOK partners could jointly generate innovative research (Strategisen Huippuosaamisen Keskittymät, 2006).

The SHOK instrument was created to introduce a R&D financing and organizing instrument positioned between the fundamental research programs funded by the Academy of Finland and the applied research programs funded by Tekes, the Finnish Funding Agency for Technology and Innovation. The goal is to support innovative activities that require both a high level of investment and a high degree of cooperation between private and public actors (Edquist, Luukkonen, and Sotarauta 2009; Nikulainen and Tahvanainen 2009). It is an effort to move towards more demand based innovation with an emphasis on economic relevance, with an officially stated vision of contributing to industrial renewal. The clusters presently supported by the instrument are the forest industry, the ICT-industry, the metal industry, the clean-tech industry, the building industry and the healthcare industry. Between 2008 and 2012, Tekes, the principal public financer of the instrument invested a total of 343 million euros in the SHOK programs, with 40% of the research within the SHOKs being co-funded by participating companies (Lähteenmäki-Smith et. al., 2013).

The SHOKs are organized into hierarchical systems, hosting several independent research programs, each one consisting of numerous separate work packages. The SHOK is formed as a legal entity, a non-profit limited liability company, representing an industrial cluster with shareholders composed of private companies and research institutes (from 19 to 53 partners). Each SHOK defines a Strategic Research Agenda (SRA), forming a vision about the likely evolution of the industry, that is enacted through different research programs (from 2 to 9 projects, depending the SHOK), each one composed of work packages concentrating on sub-technologies of the focus area. The SHOK Ltd:s are jointly led by a CEO and CIO, and the programs themselves are controlled by a focus area director and an academic director together. Individual work packages have project managers.

In the summer of 2007 the first SHOK, Finnish Bioeconomy Cluster FIBIC Oy (initially named Forestcluster Oy) was launched. Others would be formed in the following two years (TiVi Oy, FIMECC Oy and CLEEN Oy in 2008, and RYM Oy and SalWe Oy in 2009) until a final number of six SHOKs were in operation (Nikulainen & Tahvanainen, 2009). The SHOKs faced a substantial amount of criticism in their early years, with various different issues being included in the debate. Conflicts over ownership of IPR were reportedly commonplace, especially between industrial and academic partners (Nikulainen & Tahvanainen, 2009; Jarvenpaa & Wernick, 2011; Tahvanainen, 2009). University and corporate representatives also frequently disagreed on the intended scope and time orientation of SHOK research – was the focus on long-term, scientific research or more fast-paced product development (Strategisen huippuosaamisen keskittymät, 2011; Paananen, Irrmann & Smeds, 2013; Jarvenpaa & Wernick, 2011; Lähteenmäki-Smith et. al., 2013)? The SHOKs had also proclaimed to be aiming at high levels of internationalization in their operations, but this goal seemed to not be reached in reality (Strategisen huippuosaamisen keskittymät, 2011; Paananen, Irrmann & Smeds, 2013, Lähteenmäki-Smith et. al., 2013). A consistent complaint throughout the SHOKs' existence was that there has been a lack of openness especially in the preparatory phases of new research programs (Paananen, Irrmann & Smeds, 2013; Lähteenmäki-Smith et. al., 2013). All of the aforementioned critiques have also been reported by many of our informants during the interviews we have conducted.

The SHOKs themselves made efforts to deflect the criticism and alleged misinterpretations of SHOK operations. Another vocal defender of the new innovation policy instrument was Tekes's Director responsible for SHOK-related matters, who wrote several blog entries in attempt to clarify the purpose and nature of the instrument. A common theme in the defenses from with the SHOKs was a call for patience; the instrument was still young and results could only be expected after several years of operation (Strategisen huippuosaamisen keskittymät, 2009; Mörk, 2009; Kivikoski, 2012). Despite the criticism, especially the industrial partners involved seem happy with the concept and are willing to continue with minor modifications to the operating model. Likewise, there is still political goodwill that ensures that the SHOKs will continue to operate at least for the time being and Tekes will continue to fund the SHOKs with 20% of its allocable funds also in the future.

As such, the SHOK instrument looks like a classical innovation policy vehicle, focusing on resource aggregation, organization of proximity, and

setting up governance rules and funding decision protocols. However, we argue that the instrument is reproducing the blind spots of other forms of innovation policy, focusing mainly on STI modes of innovation and leaving the DUI mode aside. We question whether it was optimally designed for generating the kind of industrial renewal, cooperative dynamics and international reach it was originally planned to achieve. We take a look at the roadblocks identified by the main actors of the SHOK operations, analyze the discrepancies between the SHOK concept and the operational realities, and try to trace back some of the sources of the tensions.

### 3. RESEARCH FIELD AND DATA ANALYSIS

The research context of this study is the actors inside and around the SHOK innovation policy instrument, that is universities, research institutions, companies and funders. The qualitative data used in this paper was collected in Finland between September 2009 and December 2012. The data consists of 42 semi-structured interviews with 42 SHOK-affiliated interviewees working for public research organizations, companies, Tekes or the administration of SHOKs. The length of the interviews varies between 46 and 131 minutes. The interviewees represented all organizational levels, from directors and managers to researchers, advisors, lawyers and project coordinators within their respective organizations. All interviews were transcribed, and coded by a team of three researchers.

We also used all the publicly available secondary data about SHOK activities (reports, evaluation, press) to increase our insights about the specific context, history and organization of the different SHOKs and of their sub programs. We also had access to internal reviews of individual SHOK programs.

The ATLAS.ti software package was used to support coding, iterative analysis, cooperative analysis and reporting of the findings. We met to discuss the codes and the themes that emerged, defined together that the label we used had the same meaning, and double checked the content of the interviews to reach agreement about our interpretative analysis.

## 4. FINDINGS

### 4.1 The birth of an innovation policy instrument: the SHOK

The history of the SHOK innovation policy instrument can be traced back to the year 2003, when a political decision was made at the national level to initiate an evaluation of the structure of the public research system of Finland. As a result of this evaluation, the Finnish government decided to renew the research system through multiple steps, one of which would be the creation of a number of “internationally competitive competence centers of science and technology” (Strategisen huippuosaamisen keskittymät, 2006). Another document concerning the internationalization of Finnish science and technology from 2004 calls for the creation of more “interesting, internationally visible, and high-quality research units, research, development, and innovation clusters, and programmes” through pooling resources more efficiently to accumulate a “critical mass” (Science and Technology Council, 2004).

The Science and Technology council, composed of the Prime Minister, ministries in charge of science, education and industry, and ten representatives of the national research institutions, funding agencies, employers and employees (unions and syndicates) assigned the task of devising a strategy for the implementation of the SHOKs to a working group led by Raimo Väyrynen, then the director of the Academy of Finland. The planning work was completed in June 2006, and an early SHOK executive group (johtoryhmä) officially composed mostly of civil servants was named. The SHOK strategy document mentions briefly “discussions with members of the corporate world”, but several of our interviewees reported that private sector representatives had a powerful voice in the planning stages of the SHOKs, for instance through the Confederation of Finnish Industries (EK - Elinkeinoelämän Keskusliitto). In August 2006 an official Strategy document, detailing in-depth the intended structure, organizational model, and participating industries for the SHOKs was published. (Strategisen huippuosaamisen keskittymät, 2006).

The aforementioned strategy document was written as a simple proposal for the formation of the SHOKs, but in practice the suggestions of the management team were implemented as-is in the final innovation instrument. The executive group would continue its work in guiding the SHOKs, now in an expanded capacity with more private sector representatives in its ranks (Strategisen huippuosaamisen keskittymät, 2009).

## 4.2 Ideology in the birth of an innovation policy instrument

Our interview data indicates that there are strong ideological groundings that have caused the SHOKs to emerge in the form they exist today. Both the documents detailing the founding stages of the SHOKs (Strategisen huippuosaamisen keskittymät, 2006; Strategisen huippuosaamisen keskittymät, 2009; Nikulainen & Tahvanainen, 2009) and our own informants stress that there was a will from both the incumbent political parties and the representatives of the business elite to create an industry-centered, or “demand-driven” innovation instrument, where companies, not civil servants nor researchers, would be able to allocate public research funding into the veins of research and development they deemed suitable. A shared belief seems to have been that companies hold the best competence, knowledge, patience, and will to look out for greater societal good.

### Excerpt 1 (Tekes)

“...it was this kind of announcement then, that now (they) want that companies will steer, and now (they) will start up strategic centers of top-level research, and (they) imagined that by saying this it will come true.”

### Excerpt 2 (Large multinational)

“...having lived through this I could say that this may be a case of companies versus public power. (A matter of) who is making the decisions.”

This thinking is also reflected in the organizational form the SHOKs take. They have been shaped as “privately owned non-profit limited companies” (Lähteenmäki-Smith et. al., 2013). The 2006 Strategic program for the SHOK is presenting four possible forms of legal entities, two based on contracts, and two on limited companies. The document strongly recommends the not for profit limited company forms, stating that it would offer the clearest definition of roles for different partners, and allows for great flexibility in contracting, coordination and decision making.

Informants were not able to explain why this form of organization had been chosen, several venturing to guess that the choice was probably made out of reasons of convenience, due to the fact that the limited liability company model was familiar to most corporate participants.

### Excerpt 3 (Tekes)

“We thought about quite many different forms and in the last meters, the limited company and the cooperative were competing neck to neck but we thought about all the different alternatives and we came to the conclusion that the limited company was in a way the most efficient and clear (form), because there are very clear rules about how it works, and it fits into this kind of activity.”



There was a very strong belief in the early stages that the limited company was in itself an organizational form that would automatically generate commitment, collaboration and innovation, as if collaborative processes were embedded into the legal form. Corporate representatives tended to be more trustful of the ability of the Limited company form to generate collaboration than the specialists of research funding.

Excerpt 4 (Large multinational)

“In my opinion, this ... specifically the limited liability company structure gives the possibilities for (cooperation across the SHOKs). Because it is in principle exactly the same way than companies are limited companies, and they definitely cooperate normally. Nothing special here. So there is no particular problem with that form, quite the contrary. [...] There is freedom of activity, models of activity exist and there are tons of examples and practices of cooperation between companies. So there are no problems with that principle.”

There is a certain irony to see that the limited liability corporation was recognized as a potential vector of collaboration, but two main classical incentive of the corporative system were removed: a) the pursuit of profit and b) the rule of the financier as a controller of equity and a voice in the board of the company. As such, Tekes is the main funder of the SHOK activities, providing up to 60% of the budgets, but cannot be a shareholder of the SHOK, due to the obligation of avoiding conflict of interest in public funding. Therefore it has a limited voice for influencing the activities - beyond “preaching” as one informant put it - once the programs have been launched.

In order to avoid opportunistic behaviors in a cooperative environment, Bengtsson and Kock (2000) have suggested that recourse to a neutral intermediary would be a necessity. Tekes could have (and had previously in other contexts) played this role, leveraging a wealth of expertise and experience in technology management and facilitation on joint research projects. However, the industry-led structure of the SHOKs did not allow their active participation in the day-to-day activities of the consortia.

The composition of the SHOKs, several companies in competition (competing and cooperating at the same time) in a specific industry working with research institutes of the field, suggests a logic of innovation through pooling resources in clusters. The appraisals of the SHOK instrument have suggested that there should be more collaboration both across research programs in the individual SHOKs, as well as collaboration across clusters between SHOKs (Lähteenmäki-Smith et. al., 2009). So far, this kind of cross-scientific and cross-cluster collaboration has been rare and most research work has stayed strictly within cluster silos.

## Excerpt 5 (Tekes)

“Well, the beauty in my opinion is that it starts with the assumption that all firms do have this type of in-built interest to do work for the common good with common goals. But it is not like that, as each firm has a very selfish goal to get its own agenda forward. And between these two aspects we have not been successful in combining them. And my personal hypothesis is that it cannot work with 30 organizations. It is impossible. One cannot build a whole with 30 organizations that would have a clear common objective.

As for the renewal of industry, a recent evaluation of the Finnish innovation system by a panel of 18 experts sets a rather skeptical view on the SHOK ability to go beyond the incremental improvement of old industries (Veugelers et al. 2009):

“the SHOKs cannot be expected to be “forward-looking” in the sense of being instrumental in changing the Finnish production structure through the development of new sectors of production. Neither can they be expected to enhance the creation of new firms in new sectors of production. So far they can even be judged to play a conserving role in the Finnish economy and its presently strong sectors.” (Veugelers et al 2009, p. 31)

The question remains if the specific legal entity created for the SHOKs, the non-profit limited liability company, was really appropriate for triggering collaborative activities in a network of actors locked in cooptation.

#### **4.3 Structure over process: how to forget the DUI mode of innovation**

After a careful review of both our primary data of interviews, and secondary data of official SHOK-related documentation, it is evident that the focus of both the parties involved in planning the SHOK innovation policy instrument, as well as most of the people actually in charge of running the various SHOK programs has been on designing macro-level structures and a set of administrative procedures. The focus of the planning efforts has leaned towards the definition of organizational models, funding rules and IPR regulations.

In contrast, there is almost no consideration given to how the actual micro-level interaction in this very challenging, cooperative setting is supposed to be facilitated. It is as if there is an assumption that the structure itself will take care of the management of cross-organizational collaboration. Even probing into the subject in most of our interviews proved to be challenging. When we asked our informants about how such inter-organizational, virtual

research organizations should be lead, we mostly got organizational diagrams as answers or reference to strategic planning. Leadership was seen as a mechanistic exercise of control, even in this situation where the program and project managers had very little actual power to exercise over the people they were working with.

Excerpt 6 (Tekes)

“Question (Researcher): ... whose role is it to build this culture of cooperation in the SHOKs? Is it the CEO or the chairman of the board, or the part-time project managers? [...]

Reply (Tekes): In my opinion it is the shaping of the strategy and it is the task of the board to create the strategy. Of course it uses its own resources for that preparation, but it is the board who has to set up the goals. Well, then came together with this technology industry evaluation the idea that ... may be it does not happen enough in the different SHOK and therefore we should have a “host” for the SHOK concept and it has been until now this kind of administrative executive group that has not taken a clear position about these strategic issues ...”

In the self-assessment conducted by the SHOK executive group in 2009, most of the measures used to probe the quality of their own work and collaboration tended to be of a structural nature and not a self-reflection on the content of the activities: “How often did you participate to the meetings? How well organized were the meetings? Were the strategic agendas clearly communicated?”

As the DUI approach of innovation relies on a combination of learning-by-doing and using, it requires a huge amount of informal interaction between people, within and outside the firms. SHOKs do organize regular meetings between their members, and some of the annual events are opened to the public. Judging from the different internal and external assessments, it seems that this has not been able to trigger as much innovation as expected. Direct observations of some of these meetings reveals that they are often extremely formal, made of a succession of slides shows and corporate presentations. Much more powerful were the few examples of activity-focused days where the group focuses intensively on experiential learning and the resolution of specific practical problems and challenges. The organization of regular short encounters is not necessarily enabling collaboration, and more research needs to be done in order to understand the impact and structure of encounters in innovative networks. The emergence of collaboration is not as automatic as presumed and specific interventions are needed to start it, channel it and enhance it.

## 5. DISCUSSION AND FURTHER INQUIRIES ON THE SHAPING OF INNOVATION POLICY INSTRUMENTS

In a previous work on the management of SHOK research programs Paananen, Irrmann and Smeds (2013) found that only experienced collaborating organizations working together with old partners could thrive without specifically allocating time and effort into co-creating common processes, routines and rules for inter-organizational collaboration. However, many informants questioned the level of innovativeness of such configurations. The data showed that groups without previous experience of working together and no effort put into building collaborative practices were eventually disbanded. However, a heterogeneous group of organizations who did invest considerable time and effort into co-creating common processes for collaborative innovation not only survived, but thrived and was considered as a model program, both in terms of processes and innovative outcomes (Paananen, Irrmann & Smeds 2013).

The innovation policy concepts and paradigms are often the result of the diffusion of a specific economic discourse and economic ideology. Miettinen (Miettinen 2013 Chap. 2) shows how the concept of a National Innovation Systems has emerged from works produced by the OECD that progressively trickled down into national innovation policy recommendations and instruments. He outlines that most of these influential reports are anonymous, often refer to internal documents, and cite only economic and research policy journals without a single reference to the social sciences or the humanities. It is therefore not surprising that many of the innovation tools implemented at the national level do reflect this limited attention to the human interaction and social dimension of innovative activities, focusing rather on systems, structures and macro-level economic variables.

In our inquiry into the activities of the SHOKs, we found that structures, resources allocation rules, strategic agendas and formal procedures were not enough to trigger a large amount of collaborative activity between partners, nor be enough to renew industries. The legal entity of the limited liability company, though a familiar vehicle for most, was not triggering the kind of dynamics that was expected.

This is a direct call to address the issue of DUI modes of knowledge and the design of innovation tools that will focus on interpersonal interactions, emergence of innovative knowledge communities and epistemic communities. We argue that the pooling of resources and the creation of structures and hierarchies alone is not enough to generate collaboration or

result in useful collaborative practices. These practices need to be co-created and facilitated separately for each individual collaboration context.

We wish to invite discussion on how we could integrate the micro-level practices of co-creation and collaborative activities in the context of building macro-level national innovation systems and instruments. This includes exploring new ways for the management and facilitation of collaboration over organizational and national boundaries. What kind of models and instruments should then be developed to take into account both the STI and DUI dimensions of innovation, and have an impact on the macro and the micro levels of the innovation system?

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# Collaborative Leadership as the Lens for Co-creating an Innovation – A Curriculum Reform in Management Education

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## ABSTRACT

*The paper presents collaborative leadership to create a curriculum reform in management education. In our case study, a particular business school wanted to re-modify its curriculum according to turbulence coming, first, outside of the school in terms of increasing complexity in business life and, second, from inside in terms of a large merger. As a consequence, in the co-creation process, a socially-mediated perturbation process started in the school in order to answer the turbulence. According our preliminary results, this kind of process seems to be multilevel and multiphase. It requires new attitudes and a change of the mindset to see management education containing not only knowledge but also the whole doing and being of a student. In sum, the co-creation process appeared to be crucial to foster the change and manage perturbation.*

## KEYWORDS

*Management Education, Curriculum, Collaboration, Turbulence, Perturbation, Disruptive Innovation*

## INTRODUCTION

The turbulence in current business life shows no signs to decrease. On the other way round, it seems to accelerate. Beabout (2012, pp. 17-18) defines turbulence as

“the creation of increased uncertainty [...] not necessarily denoted by measurable changes in environmental conditions [...] a human perception of this possibility”

Due to turbulence, management education of today faces severe challenges. One of them concerns the schools’ and students’ abilities to adapt to the



unpredictable changes and bind management education in a new and more tightly way to the reality of the working life. Consequently, many scholars have questioned the current curricula and started to argue that novel and innovative approaches to educate young managers are urgently needed (Axley & McMahon 2006; van der Coff 2004; Gosling & Mintzberg 2004; Kane & Goldgehn 2011; Muff 2010; Thomas & Mengel 2008). In other words, a curriculum reform has been required.

Education is considered as a rigid and culturally bound system. This also concerns management education that normally has strong and long traditions within diverse cultures, learning environments, and contexts. Thus, to really change or renew something and create an innovation is a highly demanding task and particularly requires new beliefs and new understanding (Fullan 2003). Although the slowness of changes in education can be sometime considered as a protection towards too hasty and prejudicial decisions, a wide consensus exist that real and durable changes as fruitful innovations are still too rare and difficult to be executed (Altrichter 2005). Moreover, the educational systems involve diverse sub-systems that make the innovations difficult to treat. All these facts then increasingly complicate to implement those changes that are required, indicated and recognized crucial, and even accepted amongst the stakeholders. Consequently, diverse questions arise both from the society and the management education itself: What has to be changed in management education in order to answer to the current social, economic, and political demands? What is even possible to be changed? How to implement the reform in order to productively response to the increasing complexity in the society and in the world of work?

In our paper, we aim at giving some answers or at least insights to these questions in terms of a curriculum reform. First, we argue that it does not help only to change some practices or study contents although they are essential parts in the curriculum reform. A *real paradigm shift* in management and business education is required. Second, we argue that in the paradigm shift, there is a question about to *change the very mindset*, the way how to think about management education for tomorrow. Finally, we argue that to really change the mindset makes the innovative reform highly demanding. For treating this, we will apply the concept of *disruptive innovation*, created originally by Christensen (1997). Finally, we will indicate the special nature of a management education curriculum reform and consider *collaborative leadership* both as a tool and the fundamental target of the changed mindset. In sum, we suggest that the idea of

collaborative leadership within the curriculum reform is actually a disruptive innovation that would make the paradigm shift possible.

In order to give some answers or merely insights to the questions above, we will exploit a real-life long-term curriculum reform in a business school. By means of the first results of the on-going innovation process, that is, the analysis of an ideal curriculum and several interviews of the participants and observations of the reform process, we will highlight some central issues that we consider crucial to be understood and treated if a real paradigm shift as a change of the mindset is wished to be happened.

## THEORETICAL BACKGROUND

In our paper, we consider collaboration as a central tool to response to the demands for creating innovations and change the mindset within management education. As Goldstein, Hazy and Lichtenstein (2010, p. 1) argue, innovations are crucial because firms that cannot innovate will go to the way of dinosaurs. In addition, we suggest that due to increasingly complex and turbulent working environments, collaboration itself is one of the main mindsets to survive (Goldstein et al. 2010; Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber 2006). That is to say, the fundamental prerequisite is to change the way of thinking towards collaboration as the basis for co-creating innovation. However, before describing what we understand with collaborative leadership, perturbation and its relation to turbulence will be introduced (Beabout 2012).

### **Turbulence and perturbation as to the curriculum reform**

Although agreeing with the central need for an innovative management education reform and admitting what issues are crucial to be changed, fewer are able to say what issues are actually possible to be changed and even fewer how to do it in reality. However, some rigorous theoretical considerations of educational change in turbulent situations have been currently published (Altrichter 2005). For example, Beabout (2012) discuss how the schools should exploit *perturbation* while minimizing the harmful consequences of turbulence. He (*ibid.* p. 17) defines perturbation as a *collaborative process* when people come together to answer the question “What’s next?” Educational change can now be characterized as the cycle of turbulence and perturbation when crisis and disruptions are perceived. They will be then either ignored or responded with perturbation (*ibid.*).

Turbulence can be intentional or unintentional. However, it is structurally or environmentally related. Turbulence is the perception of potentially

disruptive forces in an organization's environment or operating conditions (Beabout 2012, p. 17). In our case, turbulence refers both to the increasing complexity in business life and to the merger of the business school in question. Perturbance is then socially mediated.

"It is a social process in which people respond to turbulence by considering organizational practice" (*ibid.*)

In our case, we consider as perturbation the multiphase co-creation process of an innovative curriculum reform by an expertise community in a certain business school. This process will be explained later. According to the existing research, a theory of change should center and concentrate on the authentic human experiences and concentrate on learning through interaction and on changing existing patterns of understanding. The following components are found to facilitate conditions for the change and contribute perturbation in these kinds of contexts (Beabout 2012, p. 19): *Dissatisfaction towards the status quo; Proven leadership; Stability of finances; Enough time and resources; Valuing individuals as people and for their contribution to others; Valuing and belonging to a group; working as a team; Valuing security; Valuing openness.* We will return to them when introducing our analyses and preliminary research results.

### **Collaborative leadership**

When representing collaboration's role in the change of the mindset, our conceptual choice is based on the argument that collaboration should be at the center of the skills that tomorrow's business workers and leaders possess in order to manage uncertainty, adaptability and creativity (Goldstein et al. 2010; Lichtenstein et al. 2006). As Goldstein and others (2010, p. 1) suggest, innovations are not possible without creative collaboration and functional and flexible relations and networks.

Collaborative leadership is here understood in a very specific way pointing out to the *learning process* of a professional community (e.g. Bandura 1997). In this kind of realm, collaborative leadership has proved to have several attributes (Jäppinen 2012; Jäppinen & Maunonen-Eskelinen 2012): *participation of all the people involved, productive interaction and dialogue, shared expertise, flexible actions, commitment to the common actions, responsibility for them, negotiation in combining different interests, multiform decision-making, balance between confidence and control, and multiform evaluation.* Thus, collaborative leadership is not only about leaders or followers although they are naturally involved in it. Collaborative leadership is about all the elements within collaboration: individuals, roles, duties, tasks, behavior, instruments, technical and

psychological tools, practices, measures, activities, results, and contexts (Bass 2008). In sum, collaborative leadership is not about traditional leading or managing but focuses on how a group of people in education as teachers, students, and working life representatives, *work synergistically in organizational contexts* (Hutchins 1995; Surowiecki 2004).

Although collaborative leadership mainly indicates the mindset of a synergetic work, it surely also involves interactive (Goldstein et al. 2010; Schyns et al. 2011, p. 397). Thus, collaborative leadership is both thinking and doing, in this order. Actually, the process that generates collaborative leadership represents the cycle of turbulence and perturbation when the people turn towards each other and together respond to the disruption or crisis. In this way, they generate both new understanding and activities (Beabout 2012). Ultimately, collaborative leadership refers to a continuous and conscious learning process when diverse individuals share common endeavors in engaging in a goal-oriented action and creating synergetic something novel from the existing constituents. The novel that arises is more than the sum of its parts. It will then serve as the root for disruptive innovations.

### **Disruptive innovations**

The term ‘disruptive innovation’ was originally created by Christensen (1997). We mean here with disruptive innovation the curriculum reform that is processed as the cycle of turbulence and perturbation. Nevertheless, as Beabout (2012, p. 16) explains, disruptions alone in terms of crisis and turbulence are not very effective at supporting desirable educational changes. He suggests that instead of concentrating on disruptions themselves, the focus should be on *resolution* of disruptions. Here, fostering collaborative leadership provides such a resolution. That is, disruptive innovation as a change of the mindset involves more sophisticated pedagogies, practices, structures, and technologies that will modify the learning environment according to the unavoidable change.

In sum, we apply the term of disruptive innovation in meaning an innovation creation process that offers a novel and radical course-free curriculum, valued in emerging markets within the complexity in business life and remote from the main-stream of the traditional business school models. In this sense, the disruptive innovation of a curriculum reform is examined by collaborative leadership within a community that requires generate new understanding, new working practices, and adequate collaborative structures for the increasing complexity. Educational change is a complex process and the management schools should engage both in

coherence and competence building by way of disruptive innovations. That is to say, disruptive innovations are not normally meant for lower-order changes, for merely technical or practical improvements, but for high-order changes as a paradigm shift when the people reconsider their beliefs, attitudes, and understanding, that is, their mindset.

## METHODOLOGY AND DATA

In order to answer the challenge for a curriculum reform in management education, an expert community within the particular business school started two years ago to design and collaboratively create an innovative and novel study program needed in the increasing complexity of the current business life for the new student generation. The community in question involved professors, teachers, working life representatives, and a student. The novel curriculum was considered to be able to radically change the values, mindsets, and practices that were so far understood as workable in a more traditionally oriented management education.

When the one-year process was over, the management of the school, in spite of considering the ideas within the renewed curriculum as valuable, reconsidered the possibilities of its immediate application, mainly due to finances, resources, and organizational reasons (a merger was meanwhile happened) and postponed its implementation. This novel curriculum then remained an ideal basis for the future development. The follow-up of the reform process went on during the next academic year when an extended group of experts started to collaboratively create an implementable curriculum. When the plan was ready to be piloted, again the implementation of the whole curriculum was postponed and only a part of it was decided to be executed. This third phase of the curriculum reform process will start during the next academic year when with 1000 students as newcomers an experimentation of communities of learning will be done.

The curriculum was analyzed by the qualitative content analysis (Elo & Kyngäs 2007; Hsieh & Shannon 2005). The qualitative content analysis is a method to analyze communication messages as a systematic text analysis and interpretation. We aimed at finding out such fundamental elements that would be capable to respond to the requested change and new paradigm. First, the words and phrases of the curriculum text were distilled according to the attributes of collaborative leadership (Jäppinen, 2012) as sub-categories having the same meaning. Then, based on these sub-categories, generic categories were formed. Finally, the fundamental elements for the curriculum reform as the main category were created. Due

to the limiting writing space, we are able to introduce only one element that we consider the most fundamental as to the disruptive innovation of a novel management education curriculum. (Jäppinen & Ciusi, in preparation.)

The other part of the data consists of four in-depth interviews of the participants in the reform's first stage. The interviews were merely open discussions, conducted according to the attributes of collaborative leadership (Jäppinen 2012). Then the tape-recorded interviews were transcribed and analyzed by the qualitative concept analysis (Creswell & Plano-Clark 2007) and investigated through the special indicators of contributing or hindering perturbation, introduced in the theoretical part of this paper. In addition, field-notes and observations were exploited that supported the interpretation of the analysis process.

Some interviews and observations have already been done from the second phase of the curriculum process and their analyses are currently in process. During the next academic year, a questionnaire to the students and the teachers will be also launched and new interviews and observations done. These results are supposed to enrich our understanding of creating and implementing a disruptive innovation for changing the very mindset of the novel management education curriculum for the next generation.

## FINDINGS

### **The main element in the paradigm shift**

We named the most essential element in the mindset of collaborative leadership as **KDB**. It refers to a fluid entity of “knowledge-ability”, know-how as “doing”, and “being”. That is, it is **Knowledge plus Doing plus Being**. KDB is a unique way to interconnect knowledge taught in classes and doing and being learned in student-life and students' associations. The paradigm shift is about the interconnections between KDB and business life experiences, through co-created contents and informal knowledge evaluation. KDB includes multiform interconnections, such as inter-campus collaboration, contacts with the partners, and interpersonal communication. It encompasses connections between subject knowledge and its concrete applications. In this way, undesirable fragmentation of knowledge can be avoided and connection with the real world established. The significance of collaboration and working together is in focus. This means identification, enrichment, and cultivation of the working habits and comportment within a group and ensures communication as the basic element of the future manager's success. KDB involves sense making and understanding of rationality and points out participatory, interactive, and

interdisciplinary courses. KDB builds concrete links between the disciplines and the realities of working life. It also means integration within curriculum when small groups with a facilitator may have, for example, regular workshops. Finally, KDB ensures synergy between courses using various tools, such as templates for questions, student-teacher discussions, or collective questions about the students' dossiers.

### Facilitating the change and contributing perturbation

Our preliminary results indicate that there was really a question about to change the mindset and re-modify the pedagogical culture towards KDB. This was seen, for instance, in the two postponements of the curriculum implementation and the ambiguous development process. Although the quotations in Table 1 only represent a sample, there was clearly a tendency to facilitate perturbation in terms of increasing dissatisfaction with the status quo, emphasizing proven leadership, valuing others and their contribution, valuing the group and team work, and in a trustful and open climate. However, strong issues preventing perturbation were shortage of finances, time, and other resources. Moreover, despite of several expressed values towards individual and group contribution, also many alarming opinions were presented. Only as to the safe and open climate, very few impeding opinions were expressed. We have highlighted in italics in the Table 1 those places where the change of the mindset was the most evident.

FACILITATING PERTURBANCE	PREVENTING PERTURBANCE
<b>The stance towards the status quo</b>	
<i>They knew something was wrong and wished to advance</i> <i>Awareness and a desire for a big change</i> The most important factor for the change was the five campuses The brand is the courses, of what you learn With the merger it was hard to control this part A lot of teachers participated in. So it adds value to the outcome ...as a distinctive resource <i>You must adjust with something more dynamic, more participative, collaborative, because in the real work, in the real world, collaboration is a basis of the work today</i> <i>Not necessarily people who saw things in the same way, but all the people who were interested in moving forward in some way</i>	Most people at that time, their idea of giving a course was standing in a room and reading notes. And as technology progressed, then it became standing in a room and pressing slide They don't know what innovation is and they would much rather that everything stayed the way it has always been To try to make the project accepted. It's difficult. It is a generational problem. It would be difficult because "I don't want to change everything at the end of my career" We didn't maybe have as much impact as we would like to have had
<b>Proven leadership</b>	
Everybody has to have this mindset. <i>If you want people to adopt in your mindset then you really have to make them feel that they are crucial</i> You do feel if the organization is giving you some kind of recognition. It's more motivating than if they don't We are a global movement and it depends on some willingness from the top management.	Afterwards when this thing was presented, they all in the management said, "Very nice, very good but that this won't work. We can't do that. That's very good. Well, it's a very nice idea but of course we can't do it"

<p>You need some acknowledgment, some kind of reward. If you do the process, you must be organized by your management</p> <p><i>The top management is trusting enough</i></p> <p>It is interesting to be optimistic, you have to be, but it depends on the boss</p>	
<b>Financial issues</b>	
<p>By some miracle we were actually paid a bit of time for these meetings</p>	<p>Times are very hard. All these things cost money. How do you make improvements without it costing more?</p> <p>The most difficult is the budget</p>
<b>Time and other resources</b>	
<p>It was not a waste of time</p>	<p>We didn't have enough people from different curriculum areas</p> <p>The feeling of being in two different worlds. I mean some discrepancy between the world of the project and the real world</p> <p>In terms of time, I remember it was very short. We had to improve quickly</p> <p>We never had time with the team to do really that kind of thing. We were all most of the time under time pressure</p>
<b>Valuing individuals as people and for their contribution to others</b>	
<p>The people in the group were ready to listen and contribute</p> <p>The group was generated by itself, upon the good willing of different people</p> <p>The management recognized that it has a talented pool of people. If it gives them a free rein, they will come up with some really interesting ideas which may be a bit crazy but which will serve in the future to make something really innovative and change things. That's the nice picture</p> <p><i>We built the vision all together.</i> But in the other campus people had the same vision as well even if we never worked with them</p> <p>There are allies <i>who are always open to new stuff</i> and who are always encouraging</p> <p>Certain ideas were very easy to get accepted like communication</p> <p>If we don't do it, no one else is going to do it</p> <p>The group itself was very productive. But I think it's because you are dealing with people who are all motivated and interested and have no real reason not to welcome other ideas</p> <p>Everybody was listening to everybody</p> <p><i>The power would be just with whoever happened to be having the latest good idea. If you're useful, if you're contributing then you have the power. If not, well, maybe then it's your turn to listen</i></p>	<p>Nobody listens to you because you are not a real professor. You don't have the status, a million and one titles and degrees. You might have some but whatever it is, because it isn't in management science, it's just not important</p> <p>Sometimes I was thinking, "Okay, you are saying that because in your discipline this is like that but it's not representative of my discipline, so maybe it's difficult to do"</p> <p>The cynical picture is that the management had this group of professors who will not just shut up, who will not really take the line. And who will always need to feel that they are being useful and they need to feel they are creative but they are bloody nuisance actually. "So, what shall we do, we'll give them a thing to do, we'll give them something really fun: invent a new pedagogical model. You never know, something might come out of it. They'll probably think of something that we can later shape the way we want and it will be great"</p> <p>People who are not that interested in new stuff and encouraging</p> <p>If they don't have to do anything extra; they'll always come on board a moving train but they won't help it to move</p> <p>We also knew that in all likelihood the management would turn around and say "Very nice but we can't do it". I don't think we were that bothered. We also knew that whatever we propose is likely to have to be modified again. It doesn't necessarily cancel out what we might have decided because it all has to remain incredibly flexible</p> <p>Some teachers don't change a lot. They follow the same line they had when they started the</p>



	<p>job. They don't make the students participate</p> <p>To learn how to deal with professional life because it's completely different. It's not theory. You have to make it concretely</p> <p>Everybody is supposed to contribute and you can actually see 'the rockets', people saying things very politely, but you can feel it</p>
<b>Valuing and belonging to a group; valuing working as a team</b>	
<p>It was also an occasion to know better each other</p> <p>There was a good commitment of among the group members to the project with a lot of enthusiasms, dynamics</p> <p>People were very dedicated because it's our very life, the teaching</p> <p><i>It wasn't a question of power.</i> It wasn't a hierarchical power bestowed from outside the group. The power, such as it was and the control such as it was, was intrinsic to the group</p>	<p>The people who were not represented or we met afterwards listened very nicely and then "That was very interesting but we can't do it"</p> <p>The only voice that was not heard was the people that didn't want to come</p> <p>How it is possible to transfer our enthusiasms, our work to the other professors, what we are doing, to change behavior and to change some knowledge? This could be for others, for implementing</p> <p>There are a few voices in the wilderness who are very happy to be on board, but others are a million light years away from us</p> <p>Not necessarily a hundred per cent interested in the pedagogical side of things</p> <p>People would jump on the band wagon because it gives them a certain amount of importance</p> <p>We didn't discuss that with the rest of the group. It didn't come out of the group</p>
<b>Valuing trust and openness</b>	
<p><i>It doesn't matter if the idea was crazy , "Let's try!"; just a mentality</i></p> <p><i>We had freedom to imagine anything</i></p> <p><i>There was no hierarchy...</i>didn't feel that people were holding back because somebody was going to say "I can't do that" ...<i>very egalitarian and people felt totally free to say what they wanted.</i> Sometimes we agreed, sometimes we didn't but never to the extent that people wouldn't speak because they were inhibited</p> <p>Sometimes it was a bit more difficult to have common understanding on the issues. But I don't think we left anything along the road. And so, we were able to solve all the issues we had</p> <p>We had the feeling to be a small community</p> <p><i>So it was very open-minded. It was easy to share, to exchange, and to have stupid ideas. It was possible to trust each other</i></p> <p><i>We were not controlled.</i> It wasn't chaos because the people weren't chaotic. We had a job to do, we weren't there to dissipate. We knew what we did</p> <p><i>We had the recommendation of the management. They said "You can do whatever you want to address". And we were free without any constraint from the management</i></p> <p>It was a peer to peer discussion, very open</p>	<p>If you begin to envision something new and already people have given you the constraints, it kills the creativity</p> <p>I'm a bit frustrated because we have not yet implemented it. This is also another frustration that we didn't first try to figure out what it could be without selecting what we will do with it</p>

**Table 1 Analysis sample of the results**

## CONCLUSIONS

In our case study, we wanted better comprehend how to be able to exploit collaborative leadership as a support for disruptive innovations. As Beabout (2012, p. 17) states, schools of today have to deal with constant disruptive forces. This is certainly one reason they are so resistant to change. To support disruptive innovations, we argue that collaborative leadership is an essential element, specifically in the co-creation process to foster change and manage perturbation. In addition, it is certainly one of the reasons why the particular project as curriculum reform was being achieved.

In order to understand the change process and the role of collaborative leadership within, the conceptions of turbulence and perturbation were exploited. Although we are able to present only preliminary results, turbulence coming from outside the school seemed to push an expert community to start to co-create a new kind of management education curriculum. There collaborative leadership in terms of the entity of knowledge, doing, and being as KDB would be in the centre. Another source for turbulence seemed to be the merger resulting in a multi-campus business school. Consequently, a perturbation process to change the whole mindset towards collaborative leadership started in the particular school. However, perturbation is not ever an easy process and needs time, new attitudes and collaborative work to get an innovation to be accepted.

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# Co-Dynamics in Engendering Innovations through Collaborative Leadership – A Complexity-Based Approach

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## ABSTRACT

*The paper presents ten co-dynamics that are supposed to be those underlying forces and powers that bring about an innovation creation process. The co-dynamics as unpredictable movements have been found by a Grounded Theory approach from two large-scale data. Parts of the other data serve here as the empirical source. In order to comprehend the nature of the co-dynamic, the notion of collaborative leadership is exploited. It includes both human participants and tangible elements, such as activities, practices, measures, or tools when synergy is gained. Collaborative leadership is supposed to be, at the same time, both the very source and the result of the dynamical movements.*

## KEYWORDS

*Dynamics, Collaboration, Leadership, Synergy, Complex Systems*

## INTRODUCTION

Essential questions in innovation creation are evidently those that concern what characterize successful innovation creation processes and what might problematize them. However, some other important aspects have remained slightly aside. The research that would focus on those invisible but strong **dynamical forces and powers** that actually *bring about the innovations and impact their co-creation* is still too rare. The reason for this scarcity is not that the significance of dynamics has been denied. An increasing amount of research already exists, for instance, in the sphere of organizational and business studies (Goldstein, Hazy & Lichtenstein 2010; Hazy, Goldstein & Uhl-Bien & Marion 2008). The real reason for the scarcity might lie in the difficulty to empirically investigate the ambiguous dynamics and then relate the study to a coherent theoretical framework.

Thus, in spite of the growing number of research, there is still a great need for deeper understanding of the underneath dynamic processes that generate innovations.

To be able to theoretically and empirically investigate these forces and powers that are here called *co-dynamics*, this paper will be based on two interwoven concepts of *collaborative leadership* and *complexity*. Complexity science provides a fresh theoretical paradigm to capture and uncover the origin and emergence of co-dynamics. Collaborative leadership then affords a practical tool in terms of a model to investigate crucial elements within the dynamical processes. Here this scrutiny will be done in relation to a long-term curriculum reform process (Altrichter 2005). Consequently, this paper aims at answering to the following two questions: What are those dynamics like that engender the innovation creation? How these dynamics might be related to the co-creation process?

## THEORETICAL BACKGROUND

### **The dynamic and complex system of collaborative leadership**

To begin, 'leadership' is not here understood in its traditional sense. However, *leadership* can be still considered as an appropriate term for studying co-dynamics. This is due to that collaborative leadership involves the conception of *leading*. According to Collins English Dictionary (online), *leading* does not only mean to direct, go at the head, or have the top position. To *lead* also means to show the way by going with; to guide or be guided; to cause to act, feel, think, or behave in a certain way; induce; influence; to serve as the means of reaching; to direct the course or conduct; to initiate the action; or to tend to or result in.

Due to these highly collaboration-related meanings, I settled on to use the concept of collaborative leadership referring to the kinds of processes where a group of people together 'lead' their shared actions towards shared goals. But this seemed not yet to be enough to understand co-dynamics. Therefore, I will argue that collaborative leadership is a *dynamical system*. It means that collaborative leadership is not only about individuals, such as leaders or followers although they are naturally involved in the system (Ladkin 2009). Collaborative leadership as a dynamic system involves *all the elements within collaboration*, such as roles, duties, tasks, behaviours, instruments, technical and psychological tools, practices, measures, activities, results, or situations in specific contexts (Bass 2008; Katz & Kahn 1978). Ultimately, collaborative leadership refers to a continuous and conscious learning process (Fenwick 2012) where diverse individuals,

leaders included, share common endeavours and are engaged in a goal-oriented action in creating synergetic something novel from the existing constituents (Bandura 1997; Hutchins 1995; Surowiecki 2004). The novel that arises is then more than the sum of its parts; it is the root of innovation. Consequently, the dynamics are intentionally endowed with the prefix of co- in order to emphasize the collective nature of the process. Thus, although the individuals naturally serve as the dynamical source of an innovation, the actual locus is on the collective and synergetic creation process where the entity is more than the sum of its parts. Co-dynamics that generate innovations are seen to arise from the entire community: from its communication, activities, thoughts, emotions, and attitudes.

In order to modify a coherent theoretical framework for understanding co-dynamics, I consider collaborative leadership as a *complex adaptive system* (CAS) (e.g. Anderson 1999; Hazy et al. 2007; Stacey 1995). Although the roots of the CAS research are in natural sciences, this kind of approach is strongly gaining ground in social sciences, for instance, in business and management, and in education, i.e., in leadership and school politics (Davis & Sumara 2006; Fenwick 2012; Morrison 2002). The CAS research focuses on such non-linear dynamic systems that are complex, living, open, and fluid. The continuously changing and evolving systems consist of independent elements that highly influence both each other and the entity they form. In this way, something new and unexpected will emerge. Due to the elements' unpredictable movements, the evolution of the system cannot be predicted because they are self-organising in responding to their environment. I consider *co-dynamics as those underlying forces and powers that generate the unpredictable movements*.

What are then the independent elements of collaborative leadership? In my previous studies, I have created, piloted, and statistically and empirically tested a model called TenKeys® that includes, so far, ten attributes with explanatory nuances that describe collaborative leadership as a CAS: *polyphony, interaction, expertise, flexibility, commitment, responsibility, decision-making, negotiation, confidence-based control and evaluation*. The design and development of the model has taken several years, including progressive, both theory- and data driven qualitative and quantitative analyses. The attributes have been identified on the basis of two main sources. First, I have drawn on a comprehensive array of [leadership] theories and studies from different scholars (e.g. Goldstein et al. 2010; Hazy, et al. 2007; Gronn 2008; Harris 2009; MacBeath 2005; Uhl-Bien & Marion 2008). The second source consists of my research results from three Finnish nation-wide studies and from one long-term international

case study. These have featured several successful elements for collaborative leadership (Jäppinen & Ciusi in preparation). Because of the limited writing space, I will not include here any detailed description or the clarification of the elements. For an interested reader, they are available in other sources (Jäppinen, 2012; Jäppinen & Maunonen-Eskelinen 2012). Nevertheless, I will exploit the attributes in opening up the results.

Moreover, my idea of the evolving collaborative leadership is closely connected to the ‘duality of structure’ suggested by Giddens (1984). It means that the structural properties of social systems, such as attributes of collaborative leadership, are both the source and the outcome for the innovations they are recursively producing. Thus, their interactions describe leadership as a process and a collaborative design. In brief, the attributes serve as the fuel for co-dynamics that bring about new innovations, which in turn will serve as a source to generate new ones. In this way, the attributes provide a solid framework to empirically study the co-dynamics and their effects. Some existing research provides additional support to my theoretical considerations. For example, Klein, Sayma, Faratin and Bar-Yam (2003) outline dynamics of collaborative design. They explain how the design, such as an innovation, emerges through the interaction of many participants when they work on different elements of the design. In this respect, their study differs from mine when they see the interactive elements as individuals while in my approach the elements refer to all the constituents within a collaborative action. In addition, Klein and others (*ibid.*) see the collaborative design as a process, counting communication and interaction as prerequisites for understanding the dynamics of collaborative design.

## METHODOLOGY AND DATA

I have formulated the co-dynamics by the Grounded Theory (GT) approach with an extended and long-term data in two culturally different case studies where innovation creation was in process. The results introduced in this paper concern only one of these case studies. The GT approach helps understand the basics of a phenomenon and modify a theory or a model based on a categorical analysis of empirical data. With GT, variables called categories and their interrelationships are discovered. I did not employ the classic ‘glaserian’ method (Glaser 2012), but used an applied approach, which gives more freedom (Borgatti 2012). However, the process included the typical phases of GT (Glaser & Strauss 1967; Strauss & Corbin, 1998). The phenomenon that I focused on concerned *dynamical human*

*interaction movements that seemed to have power to bring about something new or variable to happen.*

Open coding is the first phase in conceptualizing the data by identifying, naming, categorizing, and describing the phenomena observed. When a thing is detected, a conceptual term will be given to describe it on a more general level. When same kinds of things later arise from the data, they will be coded to the same category. My open categories included the movements. The second phase in GT is dimensional positioning. There, concepts belonging to the same category are placed onto the same dimension in terms of their properties. The dimensions were used in precise the nature of the dynamics. The third phase is axial coding, where the connections between the concepts and categories of the previous phases are distinguished and defined by inductive and deductive reasoning. In this phase I generated the names for the dynamics. The final phase is selective coding, where the core-category of Co-dynamics was named and related to the other categories. Although these phases are presented in a certain order, in real life they are overlapping in the mind of the researcher. Thus far, I have discovered ten co-dynamics from the empirical data and named them as *Empowerment, Continuum, Resilience, Crossing, Polarity, Partnering, Reversal, Collision, Unification, and Passing*. The co-dynamics will be shortly introduced in Findings. (Jäppinen, in preparation.)

Because communication is considered as a prerequisite for understanding the dynamics of collaborative design (Klein et al. 2003), I used the qualitative concept analysis (Creswell & Plano-Clark 2007) when studying a multiphase curriculum reform process in a business school. The data of this paper consisted of five in-depth, tape-recorded, and transcribed interviewees of the participants in terms of free-floating discussions when thematically following the attributes of collaborative leadership. As Fenwick (2012, p. 157-158) emphasizes, a socio-material perspective should be included when using a complexity based approach. My TenKeys® model provides this kind of perspective when it includes both humans and various tangible elements, such as activities, practices, measures, or tools.

## FINDINGS

The co-dynamics' discovering process in terms of GT analysis is still going on. Most probably, the future data will uncover several new ones. Due to the limiting writing space, I am able to give only a short glimpse of the richness and variety of those co-dynamics that were found in the data. I will first describe the co-dynamic and give then some examples that



characterize the co-dynamics' effects on the innovation creation process, particularly, when they indicate its criticality. In this way, the examples provide understanding of how the co-dynamics both exploit and generate collaborative leadership in a business school's curriculum reform. After the quotations, I have placed the letters CL meaning 'collaborative leadership' and the particular attribute (in bold), along with some of its nuances.

**Empowerment** is a co-dynamic that exhorts to find a common ground on which ground to act. It cyclically connects the process and products. Consequently, it encompasses to create strong roots linking 'you' and 'me' as 'we'. When using empowerment, the community is strengthened by adding agency and ownership so that the members would feel to be real partakers in something important and crucial.

"There is a chance to implement it but *we didn't maybe have as much impact as we would like to have had*. But it's not dead. There is still time to put all in place" CL as **Polyphony**: participation, power distribution

"Sometimes we agreed, sometimes we didn't but *it was never to the extent that people would not speak because they were inhibited*" CL as **Interaction**: dialogue, conflict resolution

"*Nobody felt that they had an idea that was crushed by somebody else because even if you only had an idea, maybe somebody else would feed of that*" CL as **Expertise**: shared cognition, shared creativity

"*The nice way is to say that the directors recognized that it has a talented pool of people and if they give them a free rein, they will come up with some really interesting ideas which may be a bit crazy but which will serve in the future to make something really innovative and change things. The cynical picture is that the directors have this group of professors who will not just shut up, who will not really take the line. And who will always need to feel that they are being useful and they need to feel they are creative but they are bloody nuisance actually. So, 'What do we do? We'll, give them a thing to do, something really fun: invent a new pedagogical model. You never know, something might come out of it. They'll probably think of something that we can later shape the way we want'*" CL as **Flexibility**: freedom, assertive elasticity

"It depends on some *willingness from top management but you need some acknowledgment*" "I have understood that *top management is confident enough, some but not all*" "It was nothing like in certain meetings where you've got some director or somebody with power running a meeting and everybody is supposed to contribute and you can *actually see 'the rockets' and people saying things very politely but you can feel it*" **Confidence-based control**: power

With the co-dynamic of **Continuum**, the learning community is able to consolidate the past, present and future into a coherent whole. Continuum combines 'now' and 'then' in a supportable and understandable way and

seeks to convey the best from the past to the future so that the community would not end up to chaos. Continuum extends the community's time horizon and involves an idea of a right rhythm to advance in a given situation and in a convenient rate as well as reasons for how to proceed. Ultimately, Continuum is about the survival of the community.

"The group was made up of people *who didn't maybe have the experience* but they *knew something was wrong* and they had the *wish to advance*" "All the people were involved who were *interested in moving forward in some way*" CL as **Polyphony**: participation, consultation

"I think *expertise* means anybody who is *prepared to look at the way they do something* and say '*This is not exactly what we want. How could we change it?*' It's a step on the way" CL as **Expertise**: discerning relevant issues

"I think the *only way is a unique way of doing it*" "I'm a bit *frustrated because we have not yet implemented it*" CL as **Commitment**: promotion of actions

"If you are a really backward-looking management, *if you think that you can ignore the rest of the world and just continue doing things the way they are, you might as well pack up*" CL as **Evaluation**: indicators of success

The co-dynamic of **Resilience** means that the organization is able to actively and in an elastic way resist turbulence coming both from inside and outside of the community. It helps keeping up courage under a pressure and standing firm in difficult situations. Resilience builds up the organizational culture, skills, and architecture when yielding to the realities of life. It also adds fortitude, endurance, patience, perseverance, self-control, and persistence.

"It's not because they don't care about pedagogy. It's just because there have so *much pressure on them to write papers*. So, even if some of them have been at discussions at times, *almost none of them could be involved in the process*" CL as **Interaction**: dialogue, systematic and continuous interplay, conflict resolution

"*Sometimes it was tough* because of the *discipline differences*, because of what we think is an innovation" CL as **Expertise**: shared cognition

"We had to make a proposal but we also *knew that whatever we propose is likely to have to be modified again*" CL as **Flexibility**: assertive elasticity

"The *most difficult is the budget. Time as well*" CL as **Commitment**: collective values and principles

In fact, you need to *find the right balance* because if you have *too much heterogeneity*, then it's *difficult to find any consensus*. Or just to create consensus which is not a good way also to find innovation. So, you need to *have enough but not too much*" CL as **Decision-making**: productive solutions

The co-dynamic of **Crossing** takes simultaneously use of width, length, height, and depth. It helps to overcome the existing boundaries at different

levels of concepts, relations, and actions. It offers the community wings to fly, that is, abilities to rise above the conventional and cross not only visible boundaries but also the more hidden ones as regards concepts and relations on the various borders of authority, task, policy, and identity. Crossing particularly requires time. Hence, it also needs good preparations.

“Everybody who wanted to be involved was heard. The *only voice that was not heard was the people that didn’t want to come* because, actually, they don’t know what innovation is” CL as **Polyphony**: participation

“Communication is something that most of the business-business professors don’t really think of. They think of communication as ‘how can I advertise my businesses’. They don’t think of *communication as ‘how can I talk to someone so that they understand me’*” CL as **Interaction**: dialogue, meaning making

“We worked with a small group, a *community with an individual angle*. You had an idea, you talked about it to the whole group and *people would chip in and we all discussed*. And the *barriers went down*” CL as **Negotiation**: valuing others’ emotions, making compromises

With the *merger*, there was a *real need of having a single program* which would not be a mix of what was done in the two schools before. And one and a half year ago, when the fusion started, it was *what happened: It was just a mixture of the two old programs!*” CL as **Evaluation**: indicators of success

The co-dynamic of **Polarity** assists the community to move towards diverging directions but from the same kind of starting point. It includes practical harmony between vertical and horizontal, thus, it discerns and joins at the same time. Polarity means that the community has a common premise but aims at developing issues to differing courses. These polar movements are strongly based on common ideas, thoughts, intents, and attitudes, and realized through various activities. It gives in tandem both circumspection and courage through excitement and enthusiasm.

“It was a *hard process but very motivating at the same time, exciting and exhausting*. It was as if I were pregnant, really the same process. You have a feeling of personal satisfaction because we have done it until the end” CL as **Polyphony**: participation, consultation

“Their expertise comes from the fact that *they know that the way they have been doing it is not really right*. It doesn’t work. I think anybody who is prepared to look at the way they do something and say “This is not exactly what we want. *How could we change it?*” and then *think of different ways*” CL as **Expertise**: discerning relevant issues

“*Doesn’t matter if it’s crazy, let’s try*” CL as **Commitment**: promotion of actions

The co-dynamic of **Partnering** is about starting something from different premises but proceeding in parallel to the same direction as corresponding

actions, while keeping yet the same pace. Partnering includes power to and with; either the power is given voluntarily to somebody else or it is collectively governed. Partnering also has an ethical and moral dimension when a preference to one another is given. It is about agreement, commitment and likeminded movements, yet respecting existing differences. Partnering makes people very sensitive to each other. It includes an ability to go on with the others and requires confidence and fellowship as a joint venture.

“There were maybe some points about *what’s really innovation*, about what we can do and what we cannot do in the classroom. Sometimes we had to discuss a bit in order to *make sure we were really in the same direction*” CL as **Interaction**: dialogue, meaning making, critical questions

“Sometimes it was a bit more *difficult to have this common understanding* on the issues” CL as **Negotiation**: combining of different interests

“I think something and you think something and *we are going to work it out*” CL as **Confidence-based control**: strength

**Reversal** enables the community to change its direction in an open-minded and conscious way. It involves either avoiding something supposedly destructive or striving for something considered desirable. Reversal includes the meaning of change agency because it allows the community to find a totally new direction to be proceeded.

“We have tried, for example, to *make teachers more* than like a coacher, than a teacher; a *different relationship between student and teacher*” CL as **Interaction**: interplay, consolidation of different opinions

“To change what we are doing, to change behaviour and to change some knowledge. We had this *awareness of the big change*” CL as **Expertise**: shared cognition, common reflections

“Then you are *conscious of what you have done and you change your own practice*. It’s already ten teachers for which it is different. So, it’s already starting” CL as **Evaluation**: focusing on one’s own actions

The co-dynamic of **Collision** is influencing when some things or people are on a collision course as regards different opinions or actions. Collision means trying, testing, or redefining something that is considered important. It involves power over, that is, the power is taken, not given. When manifested, Collision usually indicates a gap somewhere in the community.

“For some aspect, we had freedom enough. But at the same time I had the feeling of *being in two different worlds*, some discrepancy between the world of the project and the real world. How it will be possible once to *build a bridge between the both worlds*? And at the same time, I had some formal meetings where it was

said that now ‘courses, classes...’ CL as **Flexibility**: persistence, freedom, making compromises

“The program directors *don’t have the same vision as the top director* because they are more operational” CL as **Commitment**: collective vision“

“The students want quality. Afterwards they *might propose something but it is mostly critique* than proposition” CL as **Evaluation**: indicators of success

The co-dynamic of **Unification** means coming from opposite directions towards points where many alternative ways disperse to various directions but finally meet and find each other at certain critical places. Actually, it signifies harmony building in diversity.

“We had *people from different disciplines*. There was a *lot of heterogeneity*. There is maybe *not enough in some areas*” “*Different people added different things*. Different people come at this thing from different angles because of by the *nature of the job they do*. They will come at it from *different degrees*” CL as **Expertise**: multi-professional knowledge

“But *I don’t think we left anything along the road*” CL as **Responsibility**: high moral standards

The co-dynamic of **Passing** includes the process of observation as a looker-on, bystander, escapee, or even sponger. It can also mean missing an opportunity either voluntary or accidentally, or to purposefully ‘come on board of a moving train’ or evasion. Passing involves the general idea either of avoiding or reaching something.

“Some professors *just have an idea*. They *try it and don’t read the literature* concerning the research *if somebody has already tried* that and what are the good things to do and the bad things and *how to avoid the problems*. Because maybe one million people have already tried that in the classroom and you could avoid it” CL as **Expertise**: mediation of multi-professional knowledge

“And actually, when you see what happened *in the first meeting we had with the directors afterwards* when the program was presented, that’s *exactly what it was*. They all said, ‘*Very nice, very good, but this won’t work. We can’t do that*’ CL as **Flexibility**: durability, confessing reality

“Because *we knew that all we were coming up with was a proposal*, and because we also *knew that in all likelihood they would turn around* and say ‘Oh we can’t do, very nice but we can’t do it’ I don’t think we were that bothered” CL as **Decision-making**: productive solutions

## CONCLUSIONS

This paper examined those processes where innovations are intentionally co-created by a group of professionals in changing and highly demanding

situations. For this, the notion of collaborative leadership for synergy creation was introduced. The study perspective of co-dynamics in generating and exploiting collaborative leadership might provide a new and fresh research perspective when collaborative leadership is understood as a complex adaptive system including both the human and material perspectives. The approach of co-dynamics has several application possibilities and could be benefitted by single organizations in providing valuable information about their inner dynamical movements. For example, if all the statements of the participants were included here, then we could have been able to make interpretations of those dynamics that seemed to particularly modify the complex adaptive system of collaborative leadership in the particular community as to its curriculum reform as an innovation.

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# Beyond the Single Project: Strategic and Cumulative Co-Design

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## ABSTRACT

*The notion of the project is widely used to structure methods for co-design, indicating that some methods are more suitable to certain project stages than other. In this paper we take a detailed and long-term look on the developments of a social media service and its co-design processes to find out what lessons one can draw regarding user involvement in different project stages. However, the development processes evolved over time with such change that no stable notion of project or project phases could be identified. Instead we observed a strategic and cumulative co-design process that build on previous developments. This suggests that co-design guidelines should be uncoupled from the assumption of stable and orderly project phases. Instead they should pay attention to neglected dimensions in the design context, such as multiple socio-technical rhythms, developer–user social distance, and the cumulation of knowledge about users.*

## KEYWORDS

*Long-term co-design, strategic user involvement, cumulative user research*

## 1 INTRODUCTION

This paper contests and develops the notion of the project as a basis for user involvement methods and co-design processes. Guidelines and method resources on co-design are important in capturing and communicating design knowledge grounded in practitioner experience and research. However, research on design and evaluation methods in human–computer interaction has been in a crisis for over a decade, indicating a gap between the methods in the literature and how practitioners actually adapt and mix methods (Woolrych et al., 2011; Gulliksen, Boivie & Göransson, 2006; Rosenbaum, 2008). Since there is no lack of methods, but rather an oversupply—some have even called it a 'method jungle' (Avison and



Fitzgerald, 1988; Iivari, Hirschheim and Klein, 2001)—the way individual methods are structured is important for method selection. The risk is that poorly structured method resources lead to suboptimal method choices, resulting in reduced impact of co-design.

A dominant way of structuring guidelines and methods for co-design and user involvement has been to suggest different methods for different stages in the project lifecycle: planning, requirements, design, implementation, testing, and post release. Other common method choice dimensions include resources available, direct/indirect access to users, and the design team's method skills (ISO TR 16982:2002, Maguire, 2001). Without further contextual detail, such notions of project can become simplified and monolithic, as if projects are isolated, stand-alone, and not related to previous work. This limits the applicability of these guidelines for further service design after market release as well as other projects that do not start from a clean slate, which in fact is the situation for most projects.

In this paper, we explore the development processes of a large-scale social media case, the social game and online community for teenagers, Habbo Hotel, operated by Sulake Corporation. The empirical data was collected during 2003–2010 by the author, who collaborated with the vendor organisation in research projects, which made long-term dialogue with developers possible (Johnson, 2013). This case provides an interesting reference, since it demonstrates how the co-design processes evolved over time, as Sulake developed from a small startup to a medium-sized organization. The Habbo development processes changed a lot over the years: early on there was no project structure, then came separate customer projects, and after a few years the product–service combination became stabilized enough to enable release management; later on agile development with monthly releases was applied. With such change, it became evident that there was no stable notion of project or project phases.

Such variation in development rhythms is believed to be common to many startup companies and bigger organizations that operate with lean and agile teams, which question the applicability of the co-design guidelines that structure methods based on project phase. Thus, the argument of this paper is that co-design guidelines should be uncoupled from the assumption of stable and orderly project phases. Instead they should pay attention to neglected dimensions in the design context, such as multiple socio-technical rhythms, developer–user social distance, and the cumulation of knowledge about users. The following sections give an overview of the developments in the Habbo case and the contextual factors that shaped the related co-design processes.

## 2 THEORETICAL BACKGROUND

Co-design is typically framed in two ways: either how to manage a particular interaction situation with one or more users, or the planning and management process when one decides how to approach users. We know a lot about particular methods to learn about users—interviews, observation, surveys, focus groups, field visits, cultural probes, and so on—and a fair deal about which factors drive the use of a method in research settings. However, we know very little about the factors that drive the selection of methods use in the long run, in a series of projects in product or service development organisations.

Current co-design methods are based on decades of research on participatory design, human-computer interaction, and computer-supported cooperative work. Many methods and models for human-centred design became popular in the 1990s, when the dominant way of framing methods as connected to project lifecycle stages was established. Whereas some argued that user research activities should precede technical design (Beyer & Holtzblatt, 1998; Hackos & Redish, 1998), a number of authors argued for integration with technical design processes (Nielsen, 1994; Cooper, 1995; Mayhew, 1999; Vredenburg et al., 2002). This latter view, where methods were connected with project lifecycle stages, was also adopted in ISO standards on human-centred design (ISO TR 16982; ISO TR 18529) and in work by the usability professionals' association (Ross et al., 2000).

The ISO standards on human-centred design were developed to help project managers design and manage the product development processes. They form one of the most peer-reviewed methods resources and have a special role in the design field, since an organisation's usability maturity (that is, how well an organization performs human-centred design activities) can be assessed through these standards. However, it remains unclear how well the maturity models in general fit actual development practice. Recent research has started to criticise simplified models of projects and development context (Svanæs & Gulliksen, 2008; Woolrych et al., 2011).

Woolrych et al. (2011) argue that the available research ignores the complexities of design practice, which leads to naïve assumptions about design methods and contexts. To remedy this situation they propose a two-part research road map, where one part involves taking design methods apart into their bits and pieces, narrowing in on specific method details. The other part encourages research to widen and be more inclusive concerning contextual and situational factors that shape the use of specific methods. This paper is concerned with the latter research strand.

The case study exemplifies social media development processes, which is different compared to co-design and development in other contexts. To be specific about these differences, social media is here treated as a computerisation movement (CM), a concept by Kling and Iacono that considers three components that interact with and shape each other: technological frames, public discourse, and organisational practice and use. Through this concept of CM, we can compare and distinguish social media from other CMs: urban information systems, artificial intelligence, personal computing, office automation, and computer-based education for example. First, specialized and mainframe computers, then mini and micro computers, computer networks, and related software were taken into use by organisations for different reasons (productivity, democratisation, collaboration). This time it is a combination of useful and usable computer-based technologies for consumers, services for groups of people, business model innovations, and active content-sharing users that is changing society. (Elliot & Kramer, 2008; Johnson, 2013)

### 3 METHODOLOGY AND DATA: CASE HABBO

Habbo Hotel is one of the oldest and most popular social media services in which children and teenagers meet, socialise, and play many types of games. Between 2003 and 2010 the service expanded from 4 localised hotels and 1 million monthly users to 11 language versions with 15 million monthly users from over 150 countries. Instead of an entrance or a monthly fee, the business model is free-to-play—revenue is based on micropayments and advertising in the hotel. In the early design of Habbo traditional pre-set game formats were avoided and instead players, called Habbos, are encouraged to create their own objectives alongside chatting, room decoration, and meeting friends. According to the developer company, *Sulake*, most of the teenage players log on after school; on average they spend around forty-five minutes per day in the hotel or on its related discussion forums.

Our data was gathered both from developers and users through a multi-method approach with varying intensity over eight years (during 2003–2010) and has been reported in detail in a PhD thesis (Johnson 2013). The research started in the fall of 2003 with pilot interviews and participant observation in Habbo user communities. During 2004 the focus was on visitor profiles, studied through a survey that reached 10, 000 users, and online texts written by Habbo users on websites, blogs and in discussion forums—so called Habbo fansites to understand the consumption in Habbo. In 2005, ten theme interviews with Habbo developers and three focus

group interviews with twelve Habbo users were organised. In 2006 one of the authors participated in the development of customer feedback methods at Sulake. From 2007 the research has concentrated on analysis, trying out new features in Habbo and keeping up-to-date through additional interviews with Sulake developers.

The data analysis proceeded in multiple waves over the years. A survey provided quantitative information on the use of Habbo. Analysis of texts written by Habbo users on fansites explored different Habbo consumption styles, popular activities, and hotel history. The topics of the user interviews were their participation histories, changing motivations, and meanings given to membership and reference groups in Habbo. Taken together, these bodies of data provide us with an excellent view of the varying forms of interchange and dialogue between the users and developers of this social media service. This case is representative beyond its target group and games to social media in general because of similarities in software business, group communication functionality, and active user communities. (Johnson & Hyysalo 2012, Johnson, 2013.)

What Sulake–Habbo consists of has changed significantly over the years. Habbo started as a pet project for a few developers and their friends, grew to become a popular online world among new media people and within a few years became mainstream for a teenage target group. Technical, economical, and organisational bottlenecks were solved so that the service could grow and scale up to become a transnational service. We group the service evolution into five stages (Table 1).

Stage	Years	Monthly Users	Hotels
Concept	1999–2000	< 10 000	1
Beta	2001–2003	< 1 million	4
Expansion	2004–2005	1–5 millions	16
Complexity	2006–2007	5–10 millions	19
Competition	2008–2010	10–15 millions	12–18

**Table 1. Habbo Service Evolution**

Concept refers to the first prototypes in 1999 and 2000: Mobiles Disco, Lumisota, and Hotelli Kultakala. At this time, the development resources were minimal as the two founding developers created the first prototypes in their free time after work and during weekends. Beta refers to the period between 2001 and 2003, when much of the basic functionality was completed. Internationalisation started through a UK partnership, followed

by a Swiss partnership. Expansion (2004–2005) is when the product was packaged so that roll out was possible in more than 10 new countries during one year (previously different code was used in different countries). Complexity refers the extension of the product to a social networking service, from 2006. Competition describes a period in which social media services for children and teenage adoption of Facebook increased. The data is reported in more depth in Johnson (2013).

## 4 FINDINGS

### 4.1 Insight into Early Development Practices

In 2005 when the author's interviews with Habbo game developers were made, it became clear that the first usability evaluation of Habbo was conducted in 2004, four years after market launch, and that only recently had usability evaluations become part of the software development process. This finding is in contrast with one main assumption present in usability engineering and user-centred design: the standard claim that usability evaluation is a critical part of every successful product or service design process. The data suggests that this claim is an overstatement, which Greenberg and Buxton (2008) also observed in other development contexts. However, this finding raises two questions with relevance to co-design processes: how did the developers manage to make a successful service without a formal usability evaluation and, if they had a sensible development process and working collaboration with users, what made the usability evaluation necessary four years after market launch?

An analysis of interviews with developers and other data sources revealed a number of compelling reasons for why usability evaluations were not necessary in the early design phases.

*The low social distance between developers and users*, manifested in active users (e.g., user-created fansites, participation as volunteer moderators) and developers' engagement in use (developers building the service for themselves and their friends, continuous informal engagement with users).

*The characteristics of social media services* in general, which here refers to short release cycles due to immediate distribution potential of social media and the efficient mediation of user practices through social media. The lead developers could get an idea, work on it, and put it out for the users still on the same day. Active users, especially volunteer moderators and other insiders, tried out the new feature, and gave immediate feedback to the developers. In the same way that users found out what happens where in

the hotel, developers could also log on to the service and check what is going on through the trend mechanisms.

*The excellence in user interface design* and user experience, perhaps due to cultural maturation and a mature user interface genre. The Habbo user interface was modeled after cartoon-like video games in the 1980s—it was minimalistic, pixelated, and had an axonometric view—and the developers added ‘online’ and ‘multi-user’ to an easy-to-use interface.

In contrast to business products where functionality is more critical than user experience, consumer software often comes with easy-to-use interfaces (Campbell-Kelly, 2003). So did Habbo, in a combination of simplicity, high graphical ambition, and a pay-as-you-go business model.

## 4.2 Expansion and Maturing Development Processes

In the previous subsection we learned that some of the functions that usability evaluation normally has in development—meeting users, seeing others use the software, getting feedback and inspiration—were already in place through other means early on in development. However, during the interviews in 2005, it was already apparent that the situation then was different from early development. Marketing was segmenting the users, usability evaluation had emerged, and beta testing was formalised into release pilots. It was still the same social media service with an easy-to-use interface, but things had changed. What changed in the development context and co-design processes? Based on the analysis, I could locate three emerging change themes.

*Increased social distance between developers and users.* In the beginning, most users were in their late teens and early 20s, but already by 2004, 75% of the users were between 11 and 14 in Finland, which meant that the developers were no longer developing for their own generation, but a younger audience. Developers’ online presence became problematic for many reasons and more specialisation occurred in the development organization, which implied that a decreasing part of the developers could be involved in the user communities. These changes made developer experience and in-house testing less adequate as arguments in quality discussions.

*Technical stabilization.* Technically, the software architecture had been refactored and rewritten, the administration was easier, and a release process with two or three releases annually had been established. There was less firefighting, more time, and resources available. No longer was there different code in different countries; Habbo had turned into a configurable service where local operators could turn features on and off on demand and new features could be rolled out to all hotels simultaneously.

More *focus on the economics* of the development. Business had become bigger, which meant that there were fewer margins for error. Also, in contrast with the development situation earlier on, where things worked out well as those in the core group could develop what they were most inspired by, now new feature development had economic measures. Potential impacts on revenues had to be estimated.

With the international expansion emerged a need to know whether the user communities were similar or different in different hotel countries. An outsourced market survey in 2004 generated customer segments and their regional distribution. To prepare for the rapid international expansion that happened during 2004–2005, focus groups were conducted. The applicability of Habbo pixel-style graphics and use of colours was evaluated for the Asian market.

The first usability evaluation in the fall of 2004 was targeted at checking the usability of service registration and those services in Habbo that were subject to a fee from the viewpoint of 10–14-year-olds. This evaluation was one among other quality enhancement and packaging efforts made to ensure that a high-quality service was duplicated to the 10 new hotel countries in 2004–2005 and that feature distribution could take place in a more controlled manner. For these reasons more documented knowledge about users and formally tested quality gained in importance.

### **4.3 Service and Community Complexity Management**

In the previous subsection we learned that the developer–user social distance had increased from being very small at launch to being somewhat broader, but developers were in touch with the user communities. Through additional interviews I found that the development situation in 2006–2007 was different from 2004. The following change themes emerged.

*Increased complexity of the service.* As the service expanded, the bigger and more diverse user population made it impossible for one person, or even a group, to have detailed knowledge about what happened in all the hotels. The service was also extended to include social networking features, such as personal and group homepages and discussion forums. This expansion and extension also meant more difficult evaluation of the service.

*New and transformed ways of knowing about users.* The user and group homepages, discussion forums, and avatar tags provided new mechanisms to see what is popular among users. A user panel of 200 volunteers in one country was recruited to give feedback on design sketches. A global youth survey created a new segmentation of Habbo lifestyles. The focus of the succeeding evaluations was not the totality of the service, but they followed

the game development, as new features and product extensions were developed.

*Changes in development rhythm.* There were more frequent releases, from twice to four times a year. Usability evaluation was not a separate process, but followed feature development. A yearly interval between the market surveys, but some continuous targeted interaction with users weekly.

#### **4.4 Competition and Globalisation**

Follow-up interviews in 2010 revealed that Sulake had implemented a new strategy to learn from users.

*User experience testing.* While the usability testing had evolved from a more stand-alone practice into a tight integration with agile software development, Sulake conducted user experience evaluations with both new and old users, internally called ‘live tests’, in one country for every major release, about once a year.

*Data-based personas.* During Spring 2009, Sulake applied the Persona method (Pruitt & Adlin, 2006). Six user archetypes had been constructed from data to represent the users. The idea was that developers have an updated reference to the goals and needs of Habbo users at hand, which could inform design solutions and evaluations.

*Data mining of user activities and automated surveys.* Data mining and monetization of user data had become more important topics in the organisation. The process of learning from surveys had been significantly developed with the aid of automation. Based on certain triggers—for instance, awhile after becoming a Habbo user, or after a few months, or after not being active for a while—users got a survey to answer.

The use of data mining and automated surveys had shifted the role of qualitative research and evaluations in person. Such methods were used more rarely and were more focused—for instance, when a pattern in the data from other sources could not be understood or when examining cross-cultural differences where a wide social distance between user researchers and users were assumed.

In contrast to previous service lifecycle stages, the representation of user needs, motivations, and aspirations were more processed, but also less direct. Instead of checking out Habbo for oneself, developers could now rely on a set of continuously updated data-driven personas.

Through these developments the rhythm of user involvement was transformed: surveys and data mining was more continuously applied,



personas were regularly updated, user experience testing took place yearly, and the big youth surveys were annual instead of biannual.

## 5 CONCLUSION

A dominant way of structuring guidelines and other advice on user involvement and co-design has been to assume project phases more or less tied to the project lifecycle, e.g. requirements analysis, implementation, testing, etc. In contrast with this literature, in this study I did not find the notion of project and project phases beneficial to structuring user involvement for social media or generalisation across cases.

When studying how the developers' user involvement practices evolved over several years, it became apparent that project phases did not structure the use of user research and involvement methods. Because of the immaturity of the social media market, social media advantages to user feedback, as well as the relatively low cost of updating the software service, I found multiple overlapping developments and rhythms in the user involvement activities. Software releases, user research, user experience and usability evaluations were sometimes more synched and sometimes in different pace depending on what made sense in different situations. Similarly, different parts of the software infrastructure evolved at different rates. For instance, some features had a slow rate of change because of low business priority, difficulties in implementation, or reliance on external frameworks, e.g., credit card payment processes.

Prior method-use history shaped what was sensible consequential method use— e.g., after the main contours of Habbo had been usability evaluated, usability evaluations turned towards smaller details. Similarly, after overall user mappings, the following enquiries fine-tune specific issues that remained open. This practice can be interpreted as a sensible ongoing tailoring of methods that becomes necessary when dealing with complex and changing phenomena. The key question hence becomes how to enrich the knowledge in the organisation and how to meet the present and long-term key concerns in service development and the organisations doing it.

In addition to the accumulation of knowledge about users, the study found that the development organisation's co-design practices were strategic. Users were involved differently as business focus changed from a 'cool hangout online' and typical usages, to catering for a changing target group (younger users and their parents), to cost-efficiency, multi-sided business, and global competition.

Given this evidence, I argue that guidelines and other advice on user involvement should be uncoupled from the assumption of stable and orderly project phases, both with regard to a notion of a project that always starts from scratch and the idea of a standard type of project that can be stabilized. In a design situation where the focus is on extending an existing service, it may be that no new user research or participation is needed, nor any questioning of the alignment of design goals and user needs—contrary to common assumptions in the communication of participatory and user-centred design principles. On the other hand, changing development contexts may render established knowledge about users obsolete. ‘Text book’ approaches to user involvement and engagement that lean on the notion of a single, stand-alone project have over-simplified product and service development.

User involvement should be structured by the actual conditions in the development context. Relevant actual conditions in this study were developer–user social distance, organisational specialisation and internal rhythm, degree of business/mission criticalness, project scope, and relevance of existing knowledge about users.

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# Co-Creation in Open Innovation

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## ABSTRACT

*This research is based on qualitative interviews with co-creators (developers) of Haka, a service for universities and polytechnics in Finland, providing a single user identity covering multiple services. The research studies Haka as a radical innovation. Our research question is: what are the benefits and costs associated with customer participation in co-creation at the firm level. The data is processed and studied from the perspective of theoretical co-creation. This research demonstrates that co-creation with customers in open innovation can lead to great success. Universities' ability to co-operate was one of the biggest strengths, and the project leadership expert understood that the vision was to create a 'trust network' i.e. a network of universities that share authentication and identification of end-users (students, employees, and others) as one. The biggest challenge according to our research was that the project was seen as the resistance to change involving big and radical systems.*

## KEYWORDS

*Co-creation, Radical Innovation, Open Innovation*

## INTRODUCTION

This research is based on qualitative interviews with co-creators (developers) of Haka, a service for universities and polytechnics in Finland, providing a single user identity covering multiple services. The research studies Haka as a radical innovation. The data is processed and studied from the perspective of theoretical co-creation. The traditional interpretation of innovation has focused on new technologies and products in the research and development department. Radical innovation has been associated with different ways to develop the business opportunities with other external partners, but customers have been left out of the scope. This research demonstrates that co-creation with customers in open innovation can lead to great success.

## LITERATURE

Innovation can be seen as the successful implementation of creative ideas, and labeled as incremental or radical. Incremental innovation is also known as competence-enhancing and radical innovation as competence-destroying (Tushman and Anderson, 1986; Anderson and Tushman, 1990). In radical innovation (RI), the promise of the opportunity is very large, and the concomitant uncertainty of the opportunity is high, (Leifer et al., 2001; Morone, 1993). Academic literature focusing on the management processes for radical innovation considers the RI project as the unit of analysis and examines appropriate project management techniques associated with high levels of uncertainty given the constraints of the large established firm (Burgelman and Sayles, 1986; Dougherty and Heller, 1994; Jelinek and Schoonhoven, 1993; Kanter et al., 1991; Leifer, 2000; Morone, 1993). RI is often characterized as disruptive, competence-destroying, or breakthrough, with all these labels sharing the same concept that radical innovation implies a discontinuity with the past (Garcia and Calantone, 2002). Successful radical innovation is surprisingly rare and most attempts at radical innovation fail (Sandberg, 2011).

As quality of service becomes more important than quality of product in an increasing number of transactions, the role of customer participation becomes more important to firms (Vargo and Lusch, 2004), the role of customer participation becomes more important. Traditionally there is no role of customers in innovation. This has recently been challenged by various researchers who note that there is also a more active role of customers in innovation, characterized especially by the notion of “co-creation” (Jaworski and Kohli, 2006). In this newer, more active process, a firm and its customers co-create new products and/or services. In this process, the firm and the customers together do the asking, listening, observing, and experimenting; that is, the firm and the customers engage in learning together. This co-creation process differs significantly from the process designed to hear the voice of the customer; it requires a very different mindset on the part of both firm and customers, and calls for a different set of behaviors.

By participating in the creation of a service, consumers actually co-create value to be delivered. As Bolton and Saxena-Iyer (2009) put it, “Co-creation refers to [a] process in which customers play a greater role in the process of value creation”, and Vargo and Lusch (2008) noted that the role of the

customer makes the value idiosyncratic (Vargo and Lusch, 2008). Another definition is that “[the v]alue co-creation process involves the supplier creating superior value propositions, with customers determining value when a good or service is consumed” (Vargo, Maglio & Akaka, 2008; Payne et al., 2008). Haka is, by these definitions, customer participation in value co-creation. When customer participation is used to co-create value and as a product/service differentiation strategy through customization or personalization (Song and Adams, 1993), consumer input (i.e. participation) is directly related to the outcome (i.e. the quality of the service obtained).

According to Bitner et al. (1997), levels of customer participation can be low (customer presence required during service delivery), moderate (customer inputs required for service creation), or high (customer co-creates the service). When the level of customer participation is low, services are standardized; they are provided regardless of any individual purchase, and payment may be the only required input from the customer. When the level is moderate, input from the client is used to customize a standard service, and customer inputs (information or materials) are necessary for an adequate outcome, but the service firm provides the service. When the level is high, active client participation guides the customized service. Service cannot then be created without the customer’s active participation, and customer inputs are mandatory to co-create the outcome.

Innovation requires individuals who commit themselves to the new idea and show a high personal involvement in the innovation project, and this is especially true with radical innovations. Gemünden et al.,(2007) and Chakrabarti & Hauschildt (1989) identified six innovator roles showing a positive influence on innovation success: the power, expert, process, technology-related relationship, and market-related relationship promoters and leadership experience of the project leader (see Table 1

The roles of promoters are defined by the type of barriers they help to overcome. The power promoter has the necessary hierarchical power to drive the project and to provide resources needed by the project. The expert promoter has specific technical knowledge for the innovation process. The process promoter has organizational know-how and intra-organizational networks, and makes the connections between the power and the expert promoter, having diplomatic skills to bring together the right people needed in innovation process. The technology-related relationship promoter is someone who has good relationships with external partners, improving collaboration and co-operation. The market-related relationship promoter is the person who promotes the project externally, and has market-related

know-how. Both relationship promoters have strong internal and external personal ties (Gemünden et al., 2007).

Table 1. Different roles in radical innovation process (Gemünden et al., 2007)

Characteristic	How this role is expressed in action
<b>Power promoter</b>	“[S]upports the project above-average from a higher hierarchical level.” Hierarchical rank of the key person
<b>Expert promoter</b>	“[P]romotes the project by his/her high technological know-how.”
<b>Process promoter</b>	“[K]nows the organizational processes and campaigns above-average for the smooth progress of the project.” “[A]cts as a link between decision makers and experts.”
<b>Technology-related relationship promoter</b>	”[H]as good relationships with important external co-operation partners.” “[S]upports the search for external co-operation partners, information exchange with co-operation partners and the collaboration with co-operation partners.”
<b>Market-related relationship promoter</b>	“[P]romotes the project by his/her market-related know-how.”
<b>Leadership experience of the project leader</b>	Experience in leading previous projects

It is also possible for promoters to have a negative effect. In particular, a strong power promoter can have a negative effect on radical innovations. This is probably due to the underestimation of technological uncertainty by power promoters and over-strong promotion of certain projects without strategic fit (Gemünden et al., 2007). Technological expert promoters can also have a negative effect, perhaps because of core competencies turning to “core rigidities” by over-focus on internal company issues (Gemünden et al., 2007, Assink 2006). Individual expertise on its own can correlate negatively to radical innovation, unless the knowledge is networked, shared and channeled through relationships (Subramaniam and Youndt, 2005).

Our research question is: what are the benefits and costs associated with customer participation in co-creation at the firm level.

## EMPIRICAL RESEARCH

Haka is a service co-created by CSC together with all universities and some polytechnics (in total 50 institutions) in Finland. The idea was for every university in Finland to use the same user authentication system. CSC realized that, in this way, they could serve more customers with smaller numbers of servers. Everyone understood that it made no sense that every service needed to carry out its own authentication, when that is a risky transaction and, of course, crucial to data security. However, the proposal that a user should not need a new username and password for every service was new. Under this new proposal, a person uses the same username, supplied by their own university, to access multiple services, and it is possible to sign in with only one user authentication, independent of location. This simultaneously improves both usability and data security.

This report is based on 15 qualitative interviews with participants in the development process of Haka. Interviewees (employees of CSC and users of the service in universities, and polytechnics that were involved in the co-creation process) were made between autumn 2011 and spring 2012. Interview questions were semi-structured and open-ended, since qualitative interviews are particularly useful for getting the story behind a participant's experiences, and the interviewee can pursue in-depth information around the topic. All the data was recorded, transcribed and coded by themes with NVivo9. Each interview took about two hours.

## Results

Unless otherwise stated, all direct quotations are from the interview transcripts.

### Radicality of the innovation

The interviewees judged Haka to be a radical innovation. Eleven answers were given numerically, and the mean of the numeric values given for the radicality of the project was 7.9 compared to the value 3 given to common projects. Some of the interviewees saw the whole concept, technology and market to be novel, but most agreed that the technique itself was not that radical, but the outsourcing of user authentication was unprecedented. In particular, the use of the network to get all the universities and polytechnics



to use the same authentication system was perceived to be a radical innovation.

## Benefits

Finland is a small country, and there is a great desire to co-operate seen among the universities. One person commented “no other country has such a deep wish to co-operate”, and several interviewees stated that universities’ ability to co-operate was one of the biggest strengths in the project, with comments including: “Our goal was common”, “Understanding was increasing with the co-operation” and “This was [the] first really concrete project with universities together”.

One interviewee commented “The approach was totally new and different from previous”. The first step of co-creation was to establish a network to create Haka. As one person said, “These forums are still alive”, and there are ‘Haka days’ and ‘ICT days’ once a year still going on, so that the network has had ongoing benefits to the participants. The project leadership expert understood that the vision was to create a ‘trust network’ i.e. a network of universities that share authentication and identification of end-users (students, employees, and others) as one. Interviewees noted that he ensured that things were done differently from before, saying “... done things differently. He understood that this is different... It is hindsight to say it became a network... They did not organize training but network meetings”, and “In this project it was needed a lot of networking skills, not just project management skills”, as well as “There was a need to think international dimension as well right in the beginning”.

Interviewees felt that communication with customers had been much better than in other long projects of which they had experience. Comments included “It was done somehow well, how things were made clear and how it was made sure, that it was easy [for]... universities to understand” and “[the] project group could present things so that it was easy to understand the goal of the project”.

Another important strength, according to interviewees, was the resources given to the project, meaning that “what CSC introduced was approved”. Also the project had more time than was considered usual, and “When you have lots of organizations involved, you need perseverance”. One person felt that this was because of the network: “One way you could say, the project had lots of resources and know-how, since all the universities were involved” and another commented “Every organization did [its] own part as well as [it] possibly could”. It was also considered exceptional that the project stayed within the time limit, and that Haka has been sustained.

Haka was a project in which everybody divided costs: “[A] key attribute was that all the participants paid the membership fee at once, even if they did not put Haka in use yet” and “Universities were brave to engage and put money into the project”.

Haka was created first of all because of a clear user need. The idea was to get every university in Finland into the same user authentication system. CSC realized that by doing so, they could serve more customers with a smaller number of servers. Interviewees applauded this idea: “The idea was of course the need. Everyone understood, that it was insane, that every service must implement this same kind of part, which happens to be very, very risky, and of course crucial to data security”. Others commented that it was a new “[w]ay of thinking, that user needs not new username and password to every service” and “[A] person can use the same username ..., that was given by [their] own university, to [access] several services”. Benefits were seen as “It makes you possible to sign in with only one user authentication. Way of thinking, not dependent where you are. It simultaneously improves both usability and data security”. It also solved (secretly) the need to improve university user control, with comments including “Universities did not know who the users are, they were not classified, people just came and went”, and others remarking on students becoming staff and issues about exchange students. Haka also ‘pressured’ universities into developing their own user management, and because of that, universities now have significantly better management systems than before Haka. Haka provides an external guarantee of quality of management systems as “You can count that your own systems are equally in good level, since otherwise you would not have [been] accepted to join Haka”.

It made no sense to interviewees to build services with over 200,000 users in a way that required every service to manage its own user identifications and passwords. Comments included “Amounts of users just exploded in a few years”, “When the amount of users grows, the needs are growing... When a critical mass is surpassed... you need to do a structure... first you have tens and rapidly hundreds of services you need to connect, and all of them have different access control mechanisms... different passwords”, and “When critical mass of these needs, the ones who needs, is surpassed, there is a need to invest time and money”.

The idea that universities test Haka themselves was seen as brilliant, since CSC would not have had more than 150 users to carry out tests. Mass testing was an important factor in Haka’s success.

## Risks

The biggest challenge for the project was seen as the resistance to change involving big and radical systems. The whole concept was new, and this was thought to have caused slowness. “It takes courage and forgetting to cast out the original idea, and to do something totally different, that was identified as the real thing”. The solution to the problem was totally new, and “The biggest challenge was to create common understanding”. One person summed it up as “The risk was that the idea would not spread and universities and polytechnics would not own it”.

Another risk was seen as resources. The project had only a few people involved. If the amount of services were to increase, maintenance resources would be a problem. One person commented that “[t]he biggest surprise was [the] amount of external services”. The project also only had a small budget. In the USA, universities work together with business partners, but in Finland there are no suitable business partners, so there was a shortage of money. This caused slowness: “In the smallest universities there is only one IT manager, who has two guys to work for him they do everything.” Considering how big the project was, it was seen to have been implemented very quickly, but “Universities proceeded at so different pace, that it took years to cover the net”.

A challenge was to generate excitement among universities about the network. “Haka was implemented with 50 organizations and the challenge was to make them do the same and to engage to common processes”. One person felt that “[i]t would have been good, if Microsoft and Linux-house would have been there also”. There was also discussion of whether students should have been involved in the co-development and whether Haka should be offered to elementary schools. But as one interviewee said: “you cannot solve all the problems at once”. The lack of engagement of top management of universities, as well as human resources departments or student services departments was probably a mistake, but “[t]he cause was probably that Haka was seen as a project, not as an enhancing of action”.

Universities are also competitors, which were seen as a potential problem, with one person commenting “If it would have been one university that started the project, say TKK or HY, it would have been much more difficult, since universities are also competitors to each other. It seems that there are always cliques”. Each university has its own big departments, so it is not seen as necessary to co-operate. This meant that it had to be seen as advantageous to join the project.

In particular, there was initially confrontation and distrust between universities and polytechnics, since universities thought they were too important to associate with polytechnics: "There was suspicion and sulking. Universities were bit self-esteem". There were also differences between universities, which created issues: "There were smaller organizations... organizations that had quite different cultural backgrounds and with shorter histories...[which]... increased the challenge", meaning that "[u]ntil the very end there were tight negotiations about contract conditions".

Data security was a challenge, partly because Haka used different systems from those with which users were familiar. One interviewee commented "It was used to base the data security on firewalls... you do not limit access with firewalls, but based on certificates", and another said "It was scary to offer applications via web without firewalls... Selling this kind of solution in this world was difficult... solutions were only sold over the private network". One generalized further and said "[with the u]ncertainty about data security and users wanted even less openness. This caused a resistance to Haka", and another noted that there was a "[g]eneral risk... whenever you do changes to services that are connected to access, you can open whatever by accident".

Interviewees felt that the interpretation of personal data and cover laws had been difficult, and these laws had driven the Haka project. Sometimes, they noted, the project had to wait for the law to change before it could proceed. On the other hand this was mentioned as strength too, since it gave project members more time to consider.

One interviewee noted that universities had generally found it difficult to prepare for Haka, and that their early preparation had been insufficient: "First preparing for commissioning was too little". Haka is only a transmission technology, but each university had to do a certain amount of preparation. The identification management system of every joining university had to be mature enough to operate the required systems, but they were found to be in a much worse state than expected. This work was done by learning and with institutions' own money. The problem was not just the systems; this was a change of the whole process. Haka influenced the whole system: "From new student[s] or staff coming in... [to] porter[s]... every new or leaving person... the whole process had to be checked". One person summed up the process as "[The p]rerequisite[s] from organizations joining Haka were high, and the challenge was to make participants do the changes and reach requirements".

The technology and market was totally new, which created its own problems, including "How to clarify first problems, when the technology is

totally new?” In addition, the demanding change happened relatively quickly, and it was felt that these kinds of leaps in technology do not happen often, causing other issues: “Technically these systems, where components are located in many places, are extremely difficult to debug. It is really difficult to find the people who have the knowledge, and reach them about the same time”.

The fear was that there would not be a suitable service offering, and some interviewees noted that it was only a start, which had led to concerns about whether to pay upfront. Comments along these lines included: “Haka is highly wonderful thing, but it is just the beginning. Now it would be important to produce services together”, “At the beginning the service offering was extremely few” and, “Universities thought, that because there were no services, why ... pay for Haka”. However, one person said “The only thing missed, was to do the thing even bigger... idea of polytechnic’s common Active directory”.

But in the end “I still cannot stop wondering, that bunch of young whippersnappers, who had a radical idea... and still they were received... and they were not part of the crowd... they were much more neutral than old farts of CSC would have been, since they were totally new guys”. So even if project management was much younger and ‘outsiders’ to project committee, they had total trust of it.

## **Roles**

When considering the different roles in a radical innovation process (Table 1), it is possible to distinguish four different people acting as promoters in the Haka project.

The process promoter was the project manager. At the start of the project, he was working at a university (TTY), but was hired by CSC as the project manager for the Haka project. He still worked on the university premises and because of that it was easy for him to meet people who worked there, and to see ‘both sides of the story’ in the network. Because of his past, he was seen as ‘one of us’ instead of ‘one of CSC’ by university and polytechnic members of the network, and so both parties trusted him.

The power promoter was identified to be a man who had a great impact on the project from behind the scenes. He took care of the financing, and “it can be said, that he combined different actors. He was [an] active person, who made things happen. He drew the big picture and was a member of [the] executive committee of CSC”, said one interviewee.

Leadership experience was provided by the project manager of the previous project (that failed to solve the problem that Haka finally solved). He, together with the project manager of Haka, understood that things must be done totally differently; that they needed a network to create Haka. He himself said “All these policies creating a network were [a] totally new kind”.

The Market-related relationship promoter was identified as an IT manager of one university (TTY). He established the ‘Haka core group’ that created the Haka project. He described to other university IT managers how Haka could solve the problems of universities, and because he was ‘one of them’, he could ‘speak the language’ for managers. Once the core group started to work full time, he moved from the ‘Haka core group’ to the Haka directors’ group.

The Technology-related relationship promoter was the project manager. “All the participants got lots of good contacts in technical aspects from CSC”, described one interviewee. “X.X. [the project manager] happened to be the first one in Finland reading about Shibboleth”, noted another interviewee.

The expert promoter was also the project manager. “X.X. [the project manager] made correct choices”, described one interviewee. “X.X. [the project manager] was doing his master’s thesis about the subject. I spoke ... with him, and understood that we must have him in the project, since he had a vision about it”, said the previous project manager.

As can be seen, three out of the six roles were filled by the project manager. This can be seen as either an advantage or a disadvantage. On the one hand, there could have been more suitable people for some roles found in the network, but on the other hand, it meant that the project manager had a strong understanding throughout the project of what was going on. It is no wonder some interviewees called him ‘Mr. Haka’.

## DISCUSSION

It is fair to say that Haka was seen as a radical innovation. The technique itself was probably not that radical, but the outsourcing of user authentication was a new approach to a known challenge. In particular, the idea of getting all the universities and polytechnics to use the same authentication system was a radical innovation.

Haka was a co-creation process, where customer participation had a key role in the creation of the service. One key issue was to recognize that Haka is not a 'project' as such, but a 'trust network'. As the starting point of the project was a customer need, there was an understanding from the beginning that the project should fully involve customers, in a co-creation style. Haka took the same length of time to create as much smaller projects and the efficiency came from co-operation.

According to Gilbert et al (1984) and Quinn (1985), organizations lack patience in terms of converting investment of time and resources into profits due to the pressures of equity markets, yet radical innovation can require more than a decade of investment before financial returns are seen. One interviewee commented that "It could have not succeeded anywhere else but at university. If it [had] been a public sector project, it would have never succeeded. [In the] private sector there would not have been enough similar actors. So the project was born under happy stars". Another said "There must be perseverance to move a large amount of actors. You could not see the benefit of Haka at first, but in the end it has been extremely beneficial for the user".

A dedicated organization that accumulates common experiences can compensate for the ease of forgetting that may occur when routines are simple and when there is little structure for managers to grasp (Argote, 1999; Eisenhardt and Martin, 2000). According to Floyd and Wooldridge (1999) and Kogut and Zander (1992), large established companies offer the slack and room to learn and experiment with new routines that start-ups cannot afford. Even if universities are kinds of 'large established companies', in Haka project: "There was no clear goal but we investigated if it goes anywhere", so the project was driven like a start-up.

According to Tushman and Nadler (1986), since organizational elements often display high levels of coherence, changing one element of a system can often mean changing others. "The idea of Haka was that it is going to be used by all universities", and the challenge was that the change was demanding and needed to happen quickly. The challenge was not the technical requirements, but the changes required from organizations, because "These kinds of technology leaps do not happen often", and this is typical for radical innovations.

According to Dougherty (1995) and Leonard-Barton (1992), an identifiable organization is needed to allow appropriate competencies to develop without being stamped out by reified rules. Interviewees noted that "University coordination should be standardized in national level with CSC or other" and "CSC has guarded that organizations engage the rules of

federation”, thus allowing the universities to develop the necessary competencies as if a single organization.

Radical innovation takes firms into high-uncertainty technical and market environments (Lynn et al. 1996; Meyers and Tucker, 1989; and O’Connor, 1998). In this case, “In a way the radical...idea [was] that all universities and polytechnics are in the same authentication, not so much in the technique”, thus making the idea slightly ‘safer’ for the customers to consider and accept.

Radical innovation also creates an entirely new market and business opportunities (Morone 1993). “Haka is wonderful thing, but it is just the beginning. Now it would be important to produce services together”, noted one interviewee. Haka made it possible to think about services being offered to all universities in Finland: “Before Haka there was no way [for] universities [to] recognize who users from different universities are. With Haka you can find out if user is student or something else. If you want to serve services to more than one university, this is the way”, and “By the year 2004 we had identified a potential of 300,000 identified users”.

Radical innovation is an arena in which technical and market uncertainties are large (Ansoff, 1957; Booz, Allen and Hamilton, 1982), and “[t]he whole concept of Haka was totally new, both technology and markets”.

It can be argued that the inability of firms to manage RI as an internally consistent system due to the lack of organizational identity explains why RIs are so often introduced by new entrants, who have developed appropriate processes that incumbents cannot adopt in mainstream organizations (Utterback, 1994). In order for Haka to happen, there was a need for a new actor (CSC) and a new employee (the project manager) both of whom could think differently.

Some argue that the organizational entity responsible for RI must be physically and culturally separated from the mainstream organization that is pressured to deliver immediate results with great efficiency (Benner and Tushman, 2003; Campbell et al., 2003; Hill and Rothaermel, 2003; Kanter, 1985). The Haka project manager had been on the university payroll for a long time. He was therefore not seen as part of CSC, but ‘separated’ from the rest of the organization, which may have been crucial to acceptance of the project by both universities and CSC.

It would be interesting to look at universities as part of the ‘innovators segment’, and to look at other successful radical innovations, and see if radical innovations are only or mostly successful, when the ‘innovator segment’ is the first segment.



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# **Barriers to co-create a new industry paradigm – systemic failures hindering BIM implementation in Finnish construction industry**

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## **ABSTRACT**

*The aim of this paper is to identify and define the systemic failures hindering the fully deployment of BIM as a systemic process innovation in Finnish construction industry. This paper contributes to innovation studies by presenting an example, how to take into account the institutional and contextual factors influencing innovation processes. Practical contribution is to create more specific understanding related the innovation processes in Finnish construction industry and identifying the systemic challenges that have to be managed in order to implement BIM.*

## **KEYWORDS**

*Systemic innovation, BIM, system failure, construction industry*

## **INTRODUCTION**

Building Information Modelling (BIM) or parametric 3D computer-aided design refers to a bundle of software and processes which are used to make a 3D digital representation of physical and functional features of a facility (A Council of the National Institute of Building Sciences, 2012). BIM is expected to be the catalyst for the radical shift within construction industry decreasing costs of collaboration, increasing quality and enabling customer involvement. In order to meet the expectations, BIM has to be exploited not just as a set of ICT-tools to draw pictures in three dimensions but as a set of IC-technologies and processes used to process, transfer and utilize information and manage complexity and fragmentation of construction project networks in a cost-effective way (Succar, 2009).

In this paper, BIM is examined as a systemic process innovation. Process innovation is defined using the taxonomy suggested by Edquist: Product innovations are new or better material goods or intangible services. Process innovations, technological or organizational, are new ways to product goods

and services. (Edquist, 2005, p. 182) The concept of systemic innovation is used as an opposite to autonomous innovation which “can be pursued independently from other innovations”. (Chesbrough & Teece, 1996) BIM as a systemic process innovation has to be developed and implemented in conjunction with complementing product and process assets. The technologies and processes are developing and implemented overlapping: BIM is “invented through diffusion” (Harty, 2005, p. 521).

BIM is a huge opportunity but at the same time, a huge problem. Research has shown that construction and design firms are adopting BIM based practices remarkably slower than its predecessor tools for two-dimensional (2D) computer aided design (CAD) (Taylor & Levitt, 2007, p. 24)(Harty, 2005, p. 521).

The research interests of this paper stems from the idea that the problems have to be identified until they can be answered. The systemic approach to innovation is adopted in order to emphasize the interaction between innovation processes and institutional environment. System of innovation is understood rather as an approach than a theory as suggested by Edquist (2005, 186-187). The focus of SI-oriented research interests is not on the elements of innovation system but on the interaction between the elements when using and diffusing new and economically beneficial knowledge (Fischer & Fröhlich, 2001).

The aim of the system failure research is to identify and addresses key factors that limit the ability of actors in the system to respond effectively (Dodgson, et al., 2011, p. 1153). From the policy design perspective, system failures are used to identify and justify the rationales for government intervention (Woolthuis et al. 2005).

The overall research problem is to find out, why BIM implementation is so difficult. The more detailed research question is formulated as follows:

*What are the systemic challenges in BIM implementation in Finnish construction industry and what are the systemic failures related to them?*

Finnish construction industry is studied as a Technological Innovation System (TIS). System of innovation (SI) is an analytical construct referring to a group of actors, networks and institutions forming a system that contribute to the overall function of developing, diffusing and utilizing new products and services. System failures are systemic imperfections leading to weak performance of the system or, as in this case, incapability to achieve systemic change. (Edquist 2005, Bergek et al. 2008)

The study is conducted as a constructive qualitative study. There are both theoretical and practical objectives in this paper. The theoretical aim is to

introduce and test a framework and appropriate methodological tools to recognize the systemic failures specific to BIM implementation in Finland. The practical target is to delineate the systemic failures in a way that is concrete and contextual enough to facilitate problem solving.

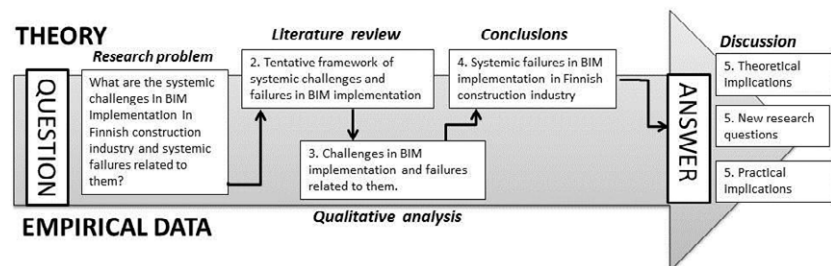
## METHODOLOGY AND DATA

Research method refers to the way the research question is answered. In this study the research method is aligned with the structure of this paper. The aim of this chapter is to declare both the method and structure and present the research process as a dialog between empirical data and theory.

The theoretical understanding about the research subject was construed through conducting a literature review that covered different perspectives of BIM implementation. The systemic challenges that have to be answered in order to implement BIM as a systemic innovation were defined based on the literature. The aim of the theoretical framework created is to generate appropriate conceptual tools for data-analysis.

The primary data consist of 43 interviews representing different actors of Finnish construction industry. The interviews have been conducted as semi-structural interviews in the first half of 2011. The interviews were recorded, transcribed and analysed employing qualitative methods.

The findings from the data were compared with the theoretical framework and based on the analysis the framework was refined. The structure of the study is presented in the picture below.



**Picture 1: Four bridges over the troubled water or the Structure of the Study**

## LITERATURE

During the literature review the BIM implementation in construction industry was examined from three perspectives: innovation in construction industry, technological innovation and knowledge diffusion and systemic

innovation in project based industry. The findings from literature were used to formulate three systemic challenges that have to be answered when implementing BIM as a systemic process innovation in construction industry: (1) achieving coordinated shift; (2) achieving systemic change and (3) creating new knowledge. The systemic failure literature was reviewed separately and synthesized with systemic challenges.

### **Defining systemic failures**

OECD defines system failures as “mismatches between the components of the innovation system” (OECD, 1997, p. 102). Various authorities have attempted to categorize system failures (Smith, 2000; Dodgson, et al., 2011; Woolthuis, et al. 2005; Schienstock & Hämäläinen, 2001). The majority of recent categorizations include four systemic failures: infrastructural failure, institutional failure, interaction or network failure and capability failure.

*Infrastructural failure* refers to the lack of infrastructure enabling or supporting innovation activities in everyday business operations. Following definitions by Smith 2000, Schienstock and Hämäläinen (2001) and Woolthuist et al. (2005) the infrastructure failures are divided into two categories: physical infrastructure and knowledge infrastructure failures.

*Institutional failure* refers to institutions that are hindering innovations (Woolthuis, et al., 2005, pp. 610-614). In this paper are used subcategories of formal and informal institutions: Formal institutions, such as rules, instructions and laws, form the explicitly defined framework for interaction. Informal institutions, such as behavioural rules and cultural norms, define how the rules are interpreted.

*Interaction failures* may refer both to too strong or too weak interaction between actors within the innovation system. Weak network failure slow the rate of the adoption of new technology and increase costs of R&D. Strong cooperative relationship among an established group decrease the weak ties bridging the group with other networks. Closed network is more likely to fail to gather required information. (Woolthuis, et al., 2005, pp. 610-614)

*Capabilities` failures* cause same kind of lock-ins than interaction failures, but the causes are different. Instead of problems in interaction, capabilities` failure refers to lack of the competencies, capacity, flexibility and other resources hindering the adaption of new technology and changing market demand. (Woolthuis, et al., 2005, pp. 610-614)

## Formulating systemic challenges

First of the key challenges is related to the need for coordinated changes among multiple stakeholders. In contrast to an autonomous innovation, coordination is needed not only with the suppliers and customers, but also with the producers of complementary products and competitors. (Maula, et al., 2006)

In the case of a systemic innovation, processes cross organizational boundaries and set new requirements for complementary assets. Fragmentation of the construction industry and complexity of the end production increase task interdependences and complicate coordination (Dubois & Gadde 2002).

Based on the literature review the coordination challenge is divided into two categories. (1) Challenges in managing the dynamics between mutual dependent organizations are interpreted as weak interaction failures. (2) Challenges managing the simultaneous development of the complement innovations are classified as infrastructure failure, because complement innovations forms the prerequisite for the effective use of BIM.

Second challenge refers to the need to achieve a radical qualitative change, something that breaks the path of technological development. Two main categories of failures hindering the systemic shift are derived from the literature: Institutions hindering the change (Dubois & Gadde, 2002, Kadefors, 1995) and incapability to handle tensions between competition, collaboration and durable development (Maula et al. 2005, Teece 1996).

Established industries, such as construction industry, are characterized with strong institutions and practices, which are created in order to regulate interaction, reduce uncertainty in inter-organizational context. Dubois& Gadde (2002) and Kadefors (1995) suggest that the systemic rigidities at construction industry would be connected to the established formal institutions such as standardized procedures and tendering system favouring standard offerings which rather maintain existing system than accelerate transformation.

Tensions between collaboration, competition and innovating refer to incapability to balance between existing business base and develop productivity over long time in collaboration but maintaining competitive advantages may hinder organizations ability to innovate and thus create lock ins (Maula et al. 2005, Teece 1996, Taylor and Levitt 2004). These are labelled as capacity failures.

Third challenge is to create new knowledge, to integrate existing knowledge and to apply knowledge to new situations. Basically, innovation stems from



the knowledge how to do things better than the existing state-of-the-art (Teece, 1986). In BIM implementation challenges related to knowledge creation form an important sub-category to both coordinated change and systemic shift, but knowledge creation has also intrinsic value for implementation. Two sub-topics are identified: (1) inter-organizational learning and (2) cumulative knowledge inside an organization.

According to Harty (2005, 514) the context in which BIM has to be implemented, is characterized by “multiple inter-organizational relations, complex interdependencies between firms and the lack of a single authoritative driving force that can see through implementation across a whole project”. The fragmentation of industry increases challenges in creating holistic perspective on BIM implementation. The challenges in inter-organizational learning are categorized as weak interaction failures.

Product-based production and emphasis on profitability of single projects are connected to the difficulties implementing systemic innovation in construction, because they do not support cumulative learning Dubois&Gadde (2002). Challenges related to broken learning loop reflect failures in institutions.

Systemic challenges	Description of the problem	Type of the failure
Coordinated change	Coordination within network	Weak interaction failure
	Coordination of complement assets	Infrastructure failure
Systemic shift	Institutions resisting the change	Institutional failure
	Tensions between organizations and time perspectives	Capability failure
Knowledge creation	Inter-organizational learning	Interaction failure
	Cumulative learning	Institutional failure

**Figure 1: Systemic challenges in BIM implementation and systemic failures related to them based on the literature.**

## FINDINGS

In this part the findings of the analysis are presented. The findings are categorized into three major classes based on the theoretical framework. The findings from the empirical data are compared with the presumptions made based on the literature review and the framework is improved.

## Failures hindering coordinated change

The data confirms that weak interaction failures within the industry network when implementing BIM is a relevant category for analysing difficulties to diffuse new technology, organize collaboration across the network, or create common understanding of the targets of BIM implementation.

The reasons behind the weak interaction failures were often reflecting institutional failures: the lack of established BIM instructions complicates the task of coordination, when instructions are not commonly known by every stakeholder in the project, and increases risks involved in the agreements.

The second subcategory in the coordination challenge is the coordinated development of complementing assets that was interpreted as infrastructure failure based on the literature. During the analysis the findings related complementing innovations were sorted based on the innovation taxonomy suggested by Edquist (2005) in order to identify the different challenges linked to different complementary innovations. The identified complementary innovations and failures related to them are presented in the picture below.

BIM			
Process		Product	
Technological	Organizational	Goods	Services
Practices and procedures to use 3D software for design, construction and maintenance. → <b>Knowledge infrastructure failure</b>	Organizational structures and job roles complementing the BIM processes. → <b>Institutional failure</b>	Modeling software combined with hardware and other complement tools to fulfill the tasks. → <b>Physical infrastructure</b>	Services creating added value or supporting BIM-modeling or the use of BIM-models. → <b>Market failure?</b>
→ Weak interaction failure			

**Figure 2: Complementary assets and failures related to them based on the findings categorized based on the innovation taxonomy by Edquist (2000).**

When examining development of the complementary innovations one by one, knowledge physical infrastructure failure, institutional failure and market failures are recognized. However, from the point of view of implementation and utilization of BIM based procedures, the challenge in coordinated development of complementary assets is interpreted as a weak interaction failure between developers of different complementary assets.

## Failures hindering systemic shift

Based on the literature two types of failures hampering to organizations ability to take the leap of systemic shift were suggested: (1) institutional

failure related to established institutions at construction industry resisting the change and (2) capability failure related to (2.1) individual level incapacity, (2.2) organizations' incapability and (2.3) network related incapacity.

The findings supported the notion presented in the literature that the strong institutions created in order to manage the complexity in construction industry may cause systemic rigidities by promoting established order and stability. The findings related to institutions hindering the change include both formal and informal institutions. Formal institutions, such as laws, regulations, instructions for procurements and general terms of agreements were often developed based on the 2D-designing paradigm and do not support the use of 3D-modelling or other innovative solutions. The data emphasises also the role of informal institutions, such as conservative organization culture, that can discourage from innovating and slow the rate of mobilization of new practices.

Findings related to the incapacity at individual level are strongly linked to the paradigmatic shift in construction accelerated by BIM because the new design paradigm destroys the value of the knowledge integrated into the old design practices. The competence in modelling is depending not only on the ability to learn but on the ability to maintain the knowledge. Organizational incapability to achieve systemic shift imply that one of the core problems lies in the incapability of organizations to deal with unknown risks embedded in innovation development. Network related incapability stems from the reallocation of money and power that cause bottleneck for systemic shift if networking firms are unable to negotiate a new solution.

### **Failures hindering knowledge creation**

The two perspectives or directions of the knowledge creation, widening knowledge through inter-organizational learning and deepening knowledge through cumulative learning, were found relevant concepts for analysis. Inter-organizational learning is hampered mostly by interaction failure in relationships between organizations and disciplines. Inadequate knowledge of the BIM related processes in different organizations and disciplines may cause conflicts or suboptimal solutions and cause overlapping development activities.

Based on the findings, the focal problem hindering cumulating the knowledge was stemming from the institutional base. The lack of organizational memory or institutionalized channels to knowledge transfer between organizations made the knowledge accumulation look like a random process. Institutional failure appears in conjunction with capability

failure when innovation activity through trying new solutions is depending on individual activity and not systematically supported by organization.

Systemic challenges		Systemic Failures	
Coordinated change	Coordination within network	Weak interaction failure	
		Institutional failure	
	Coordination of complement assets	Knowledge infrastructure failure	Interaction failure
		Institutional failure	
		Physical infrastructure failure	
	Capability failure		
Systemic shift	Institutions resisting the change	Institutional failure	
	Incapabilities hindering the change	Capability failure	
Knowledge creation	Inter-organizational learning	Interaction failure	
	Cumulative learning	Capability failure	
		Institutional failure	

**Figure 3: Systemic challenges and systemic failures in the redefined framework based on the findings.**

## CONCLUSIONS

This paper has two aims. The theoretical contribution is to introduce and test a framework to recognize the systemic challenges that have to be met in order to exploit BIM in construction industry and systemic failures related to them. Three systemic challenges were identified based on the literature: challenges to achieve coordinated change, systemic shift and create knowledge to support implementation. In addition, the types of systemic failures related to them were presumed based on the literature. The framework of challenges and failures were tested during the empirical analysis. The challenges proved to be relevant analytical concepts for analysis covering all the challenges identified from the data. Each of the challenge is related to huge theoretical tradition. This study is focused on holistic perspective and seeks to find out connections between components of the innovation system and to present new perspective to new finer-grained research questions.

The practical ambition was to describe the systemic challenges and failures in a way that could facilitate problem solving. The findings present three main systemic challenges and systemic failures related to them.

The findings imply that in order to achieve coordinated BIM implementation and systemic shift, the functioning of the technological innovation system has to be variously supported. Because the challenges are different and the failures related to them are various, there cannot be a single answer. There have to be numeral answers but they must be aligned.

Interaction failures are well recognized in the innovation system literature and also OECD (1997) suggested governments to support the interactions among enterprises. The findings imply that although inter-organizational networking can be supported, organizations cannot be forced to collaborate. The results remain suboptimal if there is no will or capacity to open communication.

In addition to dealing with interaction failure, the institutional failures call for treatments. The requirements for institutions related to coordination and systemic shift challenges seem to be conflicting. The institutions supporting coordination increase stability and decrease uncertainty embedded in transactions. As a contrast, the institutions supporting systemic shift urge for innovating activities rather increasing turbulence in project network relations.

System failures are conventionally regarded as rationale for public interventions. The findings of this study suggest that public intervention can directly shape only the minority of factors affecting systemic rigidities. Besides formal institutions, informal institutions seem to have a significant impact on the BIM implementation.

The prevailing attitudes towards transformation of informal institutions as well as towards development of other complimentary assets appeared to be passive. Possible stemming from the conflict between coordination and systemic shift the organizations suffer from incapability to develop new competitive advantages at the same time as they are maintaining the current business. Especially, the organizations seem to be unable to deal with uncertainty thus missing the possibilities linked to the new solutions.

The target to deepening the knowledge and developing innovative solutions is conflicting with the project based perspective when evaluating benefits. Especially when the question is about process innovation and tacit knowledge, the learning activities are difficult to insulate from business processes.

According to the research and conclusions made based on it, I suggest two interconnected answers to the question, why BIM implementation is so difficult. First, because the people of today have to develop the system of tomorrow, when they have only the experience and information of yesterday. Second, because they have to do it coordinated maintaining the cohesion of the system at the same time as they are supposed to tear it apart.

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# Developing key account management with customer co-created big data

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## ABSTRACT

*Supplier wants to develop deep and mutually beneficial relationships with its most important customers, key accounts. Customers themselves are a rich source of data for relationship development, and ICT provides means for gathering and analyzing the data. This research presents a case study of a high tech company that services customers in the construction industry and develops ways to improve key account management with customer co-created big data. The results of this research stress that the challenges in big data utilization are managerial and cultural, and not so much technological. In addition, co-creation within the context of customer management can promote business innovations.*

## KEYWORDS

*Big data, Co-creation, Key account management*

## INTRODUCTION

Big data is a fancy concept nowadays. It refers to data that is too big to be managed and analyzed with conventional software tools and business systems that companies have in use. Big data has the possibility to become a key driver of growth and source of competitive advantage once companies develop efficient ways to use it for business development and decision making purposes. (Manyika et al., 2011)

Customers are a rich source of data especially in the software industry where software products and ICT enabled services can log pretty much anything the users do and with whom they do it. Information technology enables innovative collaboration with the customers, allowing them to engage in co-creation to develop the offering further (Lusch et al., 2007). To utilize customer co-created big data, a company needs to integrate a number of data channels and sources, and to create necessary processes to analyze the data and use it for decision-making.



Involving users as co-creators in new product and service development has received attention in the research (see e.g. Kristensson et al., 2008), but there is far less understanding on how the same approach could be used in developing and deepening customer relationships. The question is valid especially when it comes to key accounts with whom a supplier wants to create a deep, mutually beneficial partnership.

This research sets out to investigate how co-created big data can be utilized to develop business-to-business customer relations with key accounts with whom supplier already has an established relationship. The focus is on co-creation processes that engage customer representatives through the use of ICT tools and solutions, to produce big data. The research is based on an exploratory case study of a global high tech company providing ICT enabled products and services to customers in the construction industry.

This article is structured as follows. First, the theoretical background is presented, followed by the description of research approach and data. Then, the findings are presented and finally the conclusions of the research are drawn and discussed.

## THEORETICAL BACKGROUND

Big data as a concept should not focus on the size of data but rather on the difficulty of utilizing large amounts of data efficiently for business decision making. Accumulating even more data without getting value out of it makes no sense. Big data can create value for a business by increasing transparency, enabling experimentation to discover customer needs, and improving performance by exposing variability e.g. in the quality of products and services. Effective utilization of big datasets requires development of organizational capabilities, technological solutions and customer interaction. (Manyika et al., 2011)

According to service-dominant (S-D) logic, a company gains competitive advantage by engaging in value co-creation with its customers (Lusch et al., 2007). Another foundational premise of S-D logic states that knowledge is the fundamental source of competitive advantage. By allowing customers to engage in processes and activities that allow co-creation and capture of knowledge, a supplier may position itself favorably against its competitors.

Payne et al. (2008) present customer-supplier value co-creation framework with three components that allow goal-oriented business activities:

- *Supplier value-creating processes* refer to the processes, resources and practices that supplier uses to manage its business and relationships with customers.
- *Encounter processes* refer to the processes and practices of interaction and exchange that occur between customer and supplier. Usage and service encounters are of interest here, referring to the customer practices of using supplier's products and services. Customer co-created big data is mostly a valuable by-product and not the actual purpose of the encounter processes.
- *Customer value-creating processes* refer to the processes, resources and practices that customer uses to manage its business and relationships with suppliers.

Mutual learning is an important concept in the value co-creation framework. Both customer and supplier learn from each other through the encounter processes. Supplier should assist the customer in learning about the ways the supplier can create value to the customer.

Technology, especially ICT, enables the virtualization of value-creating systems and provides a strategic driver for building competitive advantage through exploration and exploitation of knowledge (Sebastiani & Paiola, 2010). This research focuses on virtualized, i.e. ICT enabled encounter processes that enable customers to co-create big data.

Key account management (KAM) can be defined as a strategy to identify, target and serve customers that have high sales potential or possess other characteristics that make them strategically attractive to a supplier. KAM aims at developing long-term customer relationship that offers differential advantage over the offers of supplier's competitors, and provides benefits regarding reliability of supply, risk management, communications and service levels. (Jobber & Geoff, 2006)

KAM is usually not a linear process but rather a set of activities that take place in sequence or in parallel (Cheverton, 2004). The following categories of activities can be identified (adopted from Cheverton, 2004):

- **Key account selection:** Confirming (new customer) and reconfirming (current customer) status as a key account in strategic planning. Key account status can also be removed if a customer does not fulfill key account selection criteria anymore.
- **Resource deployment:** Nominating person or persons that are responsible for the account, e.g. key account manager and key account team.

- Relationship building: Identifying customer's decision-making processes and key persons, and establishing the appropriate contacts.
- Account analysis: Researching the business opportunities both short and long term by utilizing contacts with the customer's key persons.
- Objective setting: Setting the key account objectives and required measurements.
- Management of capabilities: Ensuring that internal resources and capabilities are agreed and in place to fulfill the key account objectives.
- Value proposition development: Developing and presenting the value propositions to the customer.
- Management of implementation: Managing the implementation activities, monitoring progress, measuring success and taking corrective actions as required.

The above set of activities was used as a framework to arrange the utilization possibilities of customer co-created big data in this research.

Customer relationship has three stages: initiation, penetration and termination (see e.g. Reinartz et al., 2004). This research focuses on the penetration phase in which supplier already has established a relationship with the customer and value creating transactions have taken place. In this phase, cross-selling and upselling are the most important targets for the supplier, in addition to making sure that the relationship does not advance to the termination phase.

## METHODOLOGY AND DATA

This research studies a global high tech company that has several business divisions. The case study presented here focuses on the division that provides software and hardware products and services to companies operating in the construction industry. The goal of the research was to explore the possibilities of utilizing customer co-created big data in the development of KAM activities.

### **Research approach**

This research has been done in the natural settings and normal business context of the case company. The research setting is suitable for qualitative methods with interpretative approach and explorative orientation (Ghauri

& Grønhaug, 2010). Since the research problem is stated as *how*, a case study is applicable (Yin, 2009). The case study focuses on a single setting and tries to discover deep understanding in the subject (Eisenhardt, 1989).

This research has been influenced by the fact that the researcher is employed by one of the subsidiaries of the case company, thus being an active participant in some of the business activities related to the research. At the time of the research, the researcher did not have personal objectives or incentives related to the subject of the research, which reduces the impact of possible personal biases. The positive aspect is that the researcher has had access to very rich case data. (Ghauri & Grønhaug, 2010)

### **Case description**

For a long time the case company has focused on being the technology leader in its field and trying to balance between responsive and proactive market orientation (Narver et al., 2004). At the moment the company executes mainly product business models, and its services are geared towards supporting customers in the use of the products.

Declining profit margins pose a constant challenge especially in the hardware business where the trend is towards commoditization and the product lifecycles become shorter. Development of customer management in key accounts to unlock business potential has been identified as one of the means to achieve aggressive growth and profitability targets.

The management culture of the company is profit oriented and there are scarce resources available for developing the customer management. In order to optimize resource allocation and maximize benefits from investments, deeper customer understanding is required. There are on-going development projects that enable new ways for customers to co-create data, raising the need to better utilize the data.

Construction industry is infamous for the relatively low productivity development compared to other industries (Eastman et al., 2008). Most customers do not push their suppliers for innovations and the adoption of new technologies and solutions is usually slow. As an example, most buildings are still constructed with the help of paper drawings and the information is still exchanged on paper printouts all over the world even though there are highly sophisticated ICT solutions available.

Either customer or supplier, or both together, can be pushing for innovations and increased value creation. Reflecting on the value strategy framework proposed by Möller (2006), most of the value creation relationships of the case company are either supplier driven or balanced.

Some of the big international customers are pushing for ICT utilization and therefore they make an important customer segment for the case company.

Primary data was acquired through a series of interviews and discussions with 10 informants, taking place alongside business development activities and projects. The interviews applied semi-structured, explorative questions allowing the discussion to freely elaborate on various themes depending on the informant's knowledge domain and interests. Five of the informants were employed by the case company and they were selected based on their role regarding the focus of the research. External informants were selected according to their availability and area of expertise. One of them was an expert in legal matters, one was a representative of an ICT company that is subcontracting online solutions to the case company, and one was an external expert in business intelligence solutions. In addition, two persons from customer organizations with key account status were interviewed.

Secondary data consisted of observations gathered from a number of meetings and internal workshops related to the focus of this research. In addition, company documents accessible to the researcher were used, including process descriptions, business plans, project plans and documentation of current ICT systems.

## FINDINGS

### **Premises to data co-creation with customers**

A number of data sources and channels are available. In the case company, the following virtualized channels and sources allowing co-creation with customers were identified:

- Case company's products and services used by customers.
- Customer's products, services or ICT systems that are integrated with case company's products, services or ICT systems.
- Products and services provided by third parties, used by customers and accessible to the case company, either for free or liable to charge. These include e.g. social media and external databases containing data about companies and people working for them.

Business systems like CRM and ERP play an important role as well. They contain critical information about customers and their transactions, and that data needs to be consolidated with the customer co-created data. The connection to the company's back office ICT systems actually makes the co-created big data even bigger.

Possibly the most important premise to big data utilization is the proper arrangement of identities and their management, both for companies and people. Without identities, it is impossible to consolidate data from different sources. This gives rise to the need to look at customer information management as a whole. These findings are in line with the remarks presented by Chettayar (2002).

Multinational key accounts provide challenges to the company identity management since the identification systems vary between countries. Another aspect that must be taken into account is the varying legal regulations on how company and personal information can be stored, accessed and managed.

When it comes to data that concerns the use of products and services, there are two perspectives: Firstly, there is data about what the users are doing with the products and services. This was seen as important feedback to product development, creating basis for offering innovations. Secondly, there is data about the collaboration in which the users are engaging with their partners and networks. This data may allow business innovations, i.e. ways to creatively change one or more dimensions of the business system in order to create substantial new value for both customer and supplier (Sawhney et al., 2006).

The results of this research indicate that the challenge is not so much in trying to come up with new sources and channels for data, but rather to improve the use of the current ones. At the same time the technological aspects are being developed, there should be at least equal interest to create the processes and competences to make use of the data, and to update the management system accordingly.

Even though key accounts are big companies with tens of thousands of employees, it may be challenging to get the critical mass of relevant data together. Customer's representatives need to spend enough time with data gathering products and services in order to produce material for insightful analysis. This calls for motivation and development of high quality tools that attract the users to contribute and co-create.

### **Utilizing big data in developing key account management**

The data was analyzed with the help of key account management activity categories presented in the theoretical background above.

### ***Key account selection***

In the scope of this research, the challenge with key account selection is to find out whether to continue treating a customer as a key account or not. Customer co-created big data can help the decision-making by reflecting customer's willingness to invest in the relationship and the overall attitude that the customer's representatives have towards the supplier. Utilizing the voices of a wide range of people, gradual and even sudden changes may be detected based on weak signals that indicate possible changes and trends in the future (Hiltunen, 2006). This can lead to corrective actions or even dropping of the key account status.

### ***Resource deployment***

No two key accounts are alike. The roles, responsibilities and resources required in KAM depend on the business setup of the customer. Customer co-created big data can help to size the resources to match customer needs and potential. Possibly a bigger advantage may be achieved from matching the personalities of company's and customer's representatives, with the aim of aligning cultures and interests on personal level. This understanding could be filtered from the information people reveal of themselves as individuals e.g. in the social media.

### ***Relationship building***

Being able to use multiple sources of information about who are the key persons in the customer organization may reveal critical understanding about how the relationship should be developed and managed. Internal hierarchies, decision-making models and personal roles influencing business decisions may not be visible to outside of an organization.

More interesting than customer's internal influencing and decision-making dynamics seem to be the external relationships that the customer has with its interest groups and business partners. There is usually well-established collaboration between certain partners from project to project in the construction industry. Being able to identify such links can assist in focusing the relationship building to the right people and to engage customer's interest groups in the KAM activities. Key source of such understanding can be built in the collaboration tools that are available in the products and services of the case company.

### ***Account analysis***

It is a key account manager's dream to get customer's people to produce relevant data for the account analysis. Motivating customer to do that may

be challenging, as well as being able to define what relevant data is. Finding ways to integrate supplier's analysis process with customer's planning process was seen as beneficial. In that case, customer co-created big data could provide an important information feed to the joint process.

An interesting business idea was to refine and analyze the data co-created by a customer and then provide it back to the customer to capture either financial or other type of value by the supplier. Analysis could provide added value to the customer by adding a new perspective or introducing understanding that is not part of the customer's core competence.

### ***Objective setting***

Objective setting was touched by discussion about quality of data. There are data quality challenges internally due to variations in processes and the ways business ICT systems have evolved over time. When it comes to customers and especially unstructured data, there are currently very few ways to ensure data quality. This is a challenge that needs to be tackled since poor quality data can lead to poor quality decision-making.

### ***Management of capabilities***

The benefit of customer co-created big data in the management of case company's capabilities comes from customer feedback on the success of operations. This can e.g. lead to identification of process bottlenecks and ways of using resources that do not match customer's needs or operations. In addition, important feedback and insight can be received for competence development purposes. Instead of gathering backward-looking customer feedback at yearly or so intervals, it is important to try to utilize customer co-created data to enable forward-looking nearly real-time feedback that can be used to take corrective action before the customer even realizes that something needs to be fixed.

### ***Value proposition development***

It is critical to understand what the key account is looking for and what the problem to be solved is. In practice this is about matching supplier's and customer's value creation strategies (Möller, 2006). Customer that is looking for a well-known and specified solution probably does not get very enthusiastic about radical innovations that have uncertainties. Customer co-created big data could provide insight to customer's value creation strategy.

Finding a suitable balance between responsive and proactive market orientation is important. On one hand, supplier should listen to customer



needs as expressed by the customers, and on the other hand, supplier should be proactive in identifying and addressing latent needs (Narver et al., 2004). Customer co-created big data can provide means to detect the latent needs that are not yet widely recognized but probably have been identified by some enthusiastic innovators. Catching the ideas of such individuals may provide valuable insight to value proposition development.

Value proposition development should be regarded as an activity that covers all the value creating possibilities that a supplier has, and not just the development and articulation of offering. Tools such as Business Model Canvas (Osterwalder & Pigneur, 2010) and Innovation Radar (Sawhney et al., 2006) can be used to support the development of business innovations.

### ***Management of implementation***

In the case company, customer success is usually measured with backward-looking internal metrics such as sales revenues and profits, supported by forward-looking measures of defects, deliveries and payments (Best, 2013). These measurements should be complemented with forward-looking external metrics. Examples of such metrics are customer awareness of supplier's value propositions, customer perceived performance and intent to repurchase. The data for these metrics could be gathered by asking for direct feedback from key account's key persons in more conventional ways, and then reflecting the feedback with insight available in customer co-created big data. Possibility to come up with totally new metrics and measurement innovations was also mentioned.

## **CONCLUSIONS**

The real value of customer co-created big data comes from the possibility to combine various sources of data and to triangulate findings in order to gain insight that would have been hard to get otherwise. At its best, this can be done in real time and just-in-time manner. Even though creating advanced capabilities to get the most out of big data requires technological competences and investments, the biggest challenges seem to be managerial and cultural, as suggested by LaValle et al. (2011).

The role of the insight that customer co-created big data can yield is supportive to the KAM activities. Collaborative business development and co-creation in person should still form the core of the relationships with supplier's most important customers. Learning to combine these two complementary approaches requires organizational learning on both supplier's and customer's sides.

The study of Berghman et al. (2006) shows that in order to be an innovative supplier that offers new value concepts and total solution packages, a company needs to develop competences for external knowledge recognition, assimilation and transformation. Their study stresses the need for weak signal identification, 'out of the box' observations and market sensing, complemented by the ability to integrate the insights into business innovation and management. According to the findings of this research, utilization of customer co-created big data is one of the ways to develop knowledge competences and achieve business innovations.

Being a single case study is a limitation to this research. The next logical step would be to continue the research within other industries and other types of customer relationships. In addition, given the qualitative design of this research, a quantitative study with large enough sample could be used to enhance the reliability of the results. Most of the data for this research was acquired internally in one company and in the next phase, a co-creative research process with the customers could be beneficial. Widening the scope from ICT enabled processes to all knowledge creation processes of an organization would yield insight into the role of explicit and tacit customer knowledge. This research has mostly presented ideas of the possibilities of big data utilization in developing KAM. A more thorough research is advised about the concrete dynamics of how big data can interact with organizational development and business innovation.

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# Managerial Pitfalls in Co-Creation Projects: When Design Clashes With Organisation

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## ABSTRACT

*This paper aims at investigating the major barriers and pitfalls in the adoption of “new generation” co-creation approaches and methodologies within companies. These questions are addressed based on the carrying out of a longitudinal research related to the exploration of a set of multifunctional and multi divisional innovation projects run an Italian media company. It has been conducted a processual research of the case adopting an interdisciplinary theoretical orientation. This has implied a longitudinal analysis of the case study which uses the body of literature regarding the evolution of the notion of co-creation and on the other that which concerns the concept of corporate culture. Field research has involved the collection of data directly on the field through in depth semi-structured interviews on a representative sample of key managers and in a selected sample of project participants.*

## KEYWORDS

*Co-creation, organizational change, culture, organizational risk, complex organisations, limits to innovation.*

## INTRODUCTION

Co-creation practices became a managerial hip after Prahalad and Ramaswamy article in HBR, “Co-Opting Customer Competence” (2000). Authors suggested that break-through innovation and product and service amelioration could be achieved by hiring customers as internal resources to support ideation and product and service design processes . This engagement and involvement might, in turn, reduce costs and speed up processes (Bendapudi et al. 2003; Payne et al., 2008).

Ramaswamy and Gouillart (2010) recently advised companies on a third stage of co-creation seeking to improve how companies operate throughout their organisations, and in all their systems and processes. This "full theory of interactions" goes beyond the forms of co-creation of the customer experience and co-creation of products and services and transforms traditional corporate practices such as training, performance management, and communications into co-creative interactions, sparks innovation, cuts costs, increases employee engagement, and generates value. Despite the big promises offered by this new approach to people's involvement in change processes and the enthusiast literature supporting it, there seems to be some major managerial barriers to the adoption of this new vision that might compromise its success within organisations.

This paper aims at investigating the major barriers and pitfalls in the adoption of "new generation" co-creation approaches and methodologies within companies. These issues are addressed carrying out a longitudinal research related to the exploration of a set of multifunctional and multi divisional business model innovation projects run by an Italian media company using a co-creative approach and techniques. It has been conducted a processual research of the case adopting an interdisciplinary theoretical orientation. This has implied a longitudinal analysis of the case study which uses the body of literature regarding the evolution of the notion of co-creation and on the other hand that which concerns the concept of corporate culture. Field research has involved the collection of data directly on the field through in depth semi-structured interviews on a representative sample of key managers and project participants.

## CO-CREATION PRACTICES IN AN ITALIAN MEDIA COMPANY

The impact of digitalisation is particularly dramatic for media companies. This disruptive change redesigns the core of media products such as newspapers, magazines and books by means of new forms of content creation and distribution through digital media and channels. These changes force media companies all over the world to re-think the nature of their business models and the processes through which they might maintain their position on complex markets and fulfil evolving customer needs. The uncertainty about the future of the media industry is widespread and despite the evidence of some best practices in transforming editorial products into digitalised offers, there is still no clear vision about the paths a company should undergo to adapt to the new environment. In order to face this dramatic change and improve its readiness to compete in new environments one of the largest media and publishing Italian company

decided to exploit the potential offered by co-creation approach to generate new and alternative visions on the business model and the value proposition in all its divisions (i.e.: newspapers, magazines, books and advertising). This radical decision pushed the company to select an external partner to support its effort by providing a set of models and tools that allow employees to “see” the present challenges differently and then design possible alternatives. The requested set of tools was selected with the following goals in mind: Overcoming organisational and cultural dogmas and beliefs; Seeing the big picture and discovering new customers’ insights and latent needs; Visualising alternative value propositions and business models; Designing innovative business models with a clear perception of the changes required and the constraints to overcome.

The set of techniques and models that seems to offer a new span of innovation relies in the design practice and in its integration with business model functioning and structure (Bucolo, 2011). The works of Schön (1983), Polyanyi (1998) and Ehn (1988) has formed the foundation of the Design Led Innovation model which has been developed. Central to this approach is the ability of the designer to construct and visualise multiple futures of an unknown complexity, which are then deconstructed to reveal needs and opportunities.

The co-creative effort of the company was based on the massive involvement of a large part of the employees at managerial and operational levels (300 people) in a series of 30 innovation workshops in the different company's divisions, designed and facilitated by the author and a team of four consultants, aimed at designing possible business models for new services and products that might lead the company to a new leadership role in digital environments. These workshops were managed through the support of facilitators familiar with the Design Led Innovation approach and the media industry dynamics and have been structured around two phases: (i) Overcoming organisational dogmas and envisioning the future; (ii) Designing a possible business model for the new business opportunities. The techniques adopted in the different phases are related to: scenario building and storytelling to generate insights related to the needs and expectations of customers in digital environments and overcome dogmas limiting the ability to see customers and their needs under a different perspective; business model definition through the use of the model proposed by Osterwalder and Pigneur (2009).

## **The project phases**

The project was composed of two different phases that involved different subjects within the organisation and generated different results.

### ***Setting the agenda for change***

The first step was the definition of the overall goal of the innovation process and the expected impact of the ideas generated on the whole company performance. This part of the project consisted in a series of meetings with company's divisional top management to establish a proper agenda to foster innovation, gain a clear vision of company markets, structure and present business model and commit top managers to the final outcome of the project. The goal of these meetings was to: Identify the lines of business development depending on the amount of resources available and the overall corporate and division strategies for the years to come; Select an area of development that could be addressed through innovation workshops and establish a goal for the innovation teams that might be at the same time challenging and yet accessible. The different areas of development, depending on the different functions involved, were linked to: The creation of a multichannel vertical platform for leisure magazines; The re-design of a book publishing company business model shifting from paper to digital publishing; The identification of multichannel marketing potentials for gossip magazines that could exploit the co-creative potential of readers;

### ***Building and managing innovation workshops***

The innovation workshop was designed to last four days, involving groups of 10 people coming from different roles and functions in an attempt to integrate the digital and the paper part of the business in the definition of new paths of growth.

Each workshop was divided into four separate parts, strictly connected between them. The different phases were designed to help people overcome organisational and industry dogmas that might limit their ability to foresee areas on innovation and new business, reshuffle their present knowledge about products, customers and markets and define new possible scenarios for their offer to add value to customers, generate new ideas and eventually structure them in adequate business models. The need to force people to formalise not only new ideas but also the business model to support them was originated by the belief, shared with managers, that in many cases even existing products in the digital format, already offered by different players

in the marketplace, could be innovated through a radically new business model to deliver them.

Each module lasted from two to four hours and generated a specific output that was functional to the success of the following parts of the workshop. The different module structures and the techniques adopted could be described as follow:

### ***Overcoming organisational dogmas***

This was the first module for the participants after an introduction on the workshop goals and agenda and some definition of digital and multichannel publishing offers and present competitive and consumer scenarios and business model. In this stage, participants are asked to generate an adequate amount of company and market elements that they perceive as possible dogmas limiting their ability to innovate and then report them. After this part is over, with the help of a facilitator dogmas are clustered together in macro groups depending on their content and commented in order to develop an open-minded approach.

### ***Scenario building and knowledge generation***

Participants were asked to depict a possible scenario for the next three years for their business. The technique used was the billboard one. In a first stage participants, divided in sub groups and using photos, images and drawings were asked to represent the major changes that would take place in the different macro environmental categories (political, economic, social, technological, etc.) in the near future. A second activity, with the same tool, is devoted to the representation of the micro-environment, taking into consideration the evolution of competition, demand and distribution for the company clients. In this second case, a set of researches and other sources of professional information were prepared and presented in order to support the participants with some quantitative background on the subject.

Billboards are then presented to all the groups and discussed in a plenary session. After the description of the possible trends in all the different aspects of the external environment, groups are asked to put all these information together creating story with a dominant theme that has their present and potential customers as main characters using storytelling techniques as the backbone of this activity. The story could be represented through drawings or simply text but has to contain all the dimensions of the macro scenario and have the customer and its organisation as the main character.

### ***Insights identification***



On the base of the different stories presented, participants, always divided in small groups, define the insights related to the main concern and interests of the characters depicted. The tool that has been adopted was the empathy map of Xplane (Osterwalder and Pigneur, op.cit.). This map has forced participants to act and think like the customer they depicted imagining, on the basis of the environmental dimensions they used to tell the story, what he sees, feels, hears, thinks, which are the main activities he/she undergoes. On the basis of these perceptions participants were able to identify the pains and the gains that their customers want to avoid and achieve and turn them into valuable insights. As a result of this process the various groups were able to identify latent needs and wants of their potential customers overcoming their product based corporate culture and the over simplified perception of their effective needs.

### ***Idea generation***

Using the Empathy map as a starting point, participants generated ideas of possible products or services that might help their customers satisfy their emerging needs and avoid their major threats about the future scenario. During the different workshops various creativity techniques were adopted (visual thinking, storytelling and prototyping) providing on the whole very similar results. The idea generation stage was divided into two different parts: i) in the first part participants generated a huge amount of ideas related to the needs identified having as a goal to create the highest number of ideas as possible; ii) in the second part of this activity the ideas generated were clustered in families and used to develop “second level” ideas that might then be selected by the group following a grid of evaluation that helped to rank the ideas in terms of innovativeness, scalability, differentiation, new value for the market and time to imitation from competitors.

### ***Business model design***

The Business Model Canvas is strategic management tool, which allows to develop and sketch out new or existing business models. It is a visual template pre-formatted with the nine blocks of a business model initially proposed by Alexander Osterwalder (2009). On the set of ideas selected participants were asked to draw the possible business model to support their products or services or systems and the expected outputs and resource needs. After the fast prototyping of the business model the groups belonging to a single innovation stream presented it each other and opened a discussion on areas of amelioration or improvement.

On the whole each workshop generated not less than two different and alternative business models to address the innovation issue and all the business models were presented to the divisional top managers in an open session for discussion and implementation. On the whole top managers declared to be satisfied with the outputs and sometimes even surprised by the high level of innovation of specific proposals. Despite the declarations of interest and the overall level of engagement of the structures involved the business model that were turned into real innovation processes and projects are almost equal to zero.

## RESEARCH ACTIVITY ON THE PERCEPTION OF WORKSHOP OUTPUTS

This sort of “organisational oxymoron” lead the author to run a longitudinal research to identify the possible pitfalls of the process adopted and the possible limits to co-creation practices in complex organisations.

The research was conducted using the following tools:

In-depth semi-structured interviews with all the team leaders to collect their perceptions and feeling on the workshops, the output and the implementation and follow up processes that took place.

In-depth semi-structured interviews with divisional top managers in order to have a better vision of the critical aspects of the outputs presented to them, the reason for such a poor follow up to the projects and their perception of the teams that took part to the workshops.

The interviews aimed at collecting an adequate amount of information on the following aspects:

- 1) perception of the team performance and responsibilities. This area of concern was addressed with questions related to the definition of team members' and managers' responsibilities in the whole innovation process with regard to economic, organisational, communication and leadership dimensions.
- 2) evaluation criteria adopted for the assessment of the output quality. This part implied a set of questions not only related to the existence of adequate (or considered so) metrics to evaluate the quality but also on the description of the whole evaluation process and its formal and informal stages.
- 3) team members expectations and managers expectations on the whole innovation process. The definition of a formal beginning and end

of the innovation process, its time span and stages together with the different roles involved were investigated through a set of questions.

4) co-creative tools evaluation and their usefulness in the innovation process. Ability to allow participants to perform their tasks, usefulness to clarify the innovation results for managers and stakeholders, ability to create positive attitudes towards working together were the items investigated in this part of the interviews.

The results of the interviews were analysed and clustered in different issues that appeared to be critical in explaining the lack of organisational impact of the whole co-creation activity. The findings highlighted how the organisational context and culture was responsible for most of the critical aspects of the innovation process. The tools adopted were, on the whole, considered excellent boosts for the innovation process but their contextualisation in the organisational culture and routines deformed their significance and transformed them into separated episodes in the organisation life more than seeds of change that needed to be cultivated. Innovators found it difficult to “sell” their vision internally and draw company attention on their ideas. The reason is related to the fact that new ideas of value have an impact on all the layers of an organisation: the strategic context, the organisational context and the emotional context, too (Doz and Thanheiser, 1996). These impacts are often underestimated by managers that focus more on the results of the innovation process and less on its level of acceptance and on the creation of an adequate environment to support and implement it. In these conditions resistances from the established culture might be overwhelming. As stated by Mintzberg et al. (1998) quoting Hurst: “Changes in destination might be made by the captain even less frequently, for they require a total value change in the organisation. And discoverers may find a new world only once in a lifetime”.

### **Organisational pitfalls and their impact on co-creation effectiveness**

During the research activities some common pitfalls emerged from interviews with both project participants and managers promoting the projects. These pitfalls could be clustered into different categories and might partially explain the difficulties encountered in developing a co-creative culture and approach within the organisation and the lack of follow up of the different business ideas presented and shared during workshops.

a) Co-creation and organisational risks. Project leaders and top managers shared a positive evaluation of the workshop outputs in regard

to their feasibility and ability to bring new competitive rules in the market. A critical aspect, on the contrary, emerged in association with the risk perception related to the deployment of the projects and the allocation of resources needed. While project leaders expected the company to support the projects with adequate resources to let them cut it through, divisional managers were, on the whole, not at ease with the idea of negotiating resources with the board or their peers on the basis of internal projects lacking of “experts” support and the reassurance of a complete success. Behind these declarations a deeper motivation could be seen: the risk of generating organisational “turmoil” with the birth of potentially new leaders that might shape company future compromising the role and leadership of top managers in the future. Another aspect highlighted by top managers was the risk of splitting their organisation between innovators and followers, generating a decrease in the motivation of their divisions and possible internal conflicts that might undermine their authority and organisational prestige. While project leaders evaluated their outputs using project related metrics (probability of success, cost-benefit ratio, scalability, protection from competition), top managers often used expressions such as “a good opportunity to learn for the future” or “a break in the routine that allowed people to think outside the box” somehow considering co-creation more as a team building tool or a rewarding instrument than a way to challenge status quo.

b) Co-creation and cultural risk. In evaluating workshop outputs, most of the people interviewed highlighted the ability of the tools used to represent clearly possible business ideas and share them in an almost intuitive manner. This same aspect was perceived as critical by top managers in sharing the projects with other functions or the board, as the representation was too off track when compared with usual business documents that are used for this purpose. They did not feel at ease in using such tool to generate a larger commitment within the organisation. Project leaders, on the other hand, stated that the use of such tools would not be possible outside such unique kind of occasions as the rest of their colleagues “would not take them seriously” and they would feel like “showing off” if using them. A manager, in particular, said that he would not feel comfortable in explaining the projects to other colleagues since that would force him to reveal the use of tools that were “too funny” and showed that people “had fun while doing their job” under his responsibility. The birth of a sort innovation jargon during the workshops was well described by project leaders that in many cases

reported their difficulty in explaining to their functional colleagues what took place during the project.

c) Co-creation and the risk of grey areas. In many cases there has been a lot of misalignments within the group and with project sponsors on the level of detail, the ownership and the allocation of resources. This fact cannot be attributed to poor managerial and project skills but more probably to the fact that in multi functional and multi divisional teams the lack of a common background limited the ability to define the expected output in a comprehensive way. Managers, in particular, expected teams to come up with solutions that might not challenge their role and responsibilities. On the other hand groups expected managerial support to bring on the projects outside the ideation phase. This pitfall is a good representation of the areas of ambiguity that co-creation processes generate in complex organisational environments.

d) Co-creation and the risk of organisational failure. The heterogeneity of teams, with many competencies and skills represented, generated some unexpected effects that could be summed up in the willingness to postpone the critical aspects of the projects to further work from single functions and divisions. Team leaders admitted that this attitude somehow reduced the quality of the project output in more than one case. In particular, managers underestimated the skill issue when creating multidisciplinary teams in favour of a balance of organisational powers and roles. Project teams felt that operational issues should be a responsibility of top managers in the deployment phase once they approved the overall concept. Project teams tended to use tools for detailed descriptions of the expected output and its operational implications (process flows, customer journey maps, etc.) more as tools to foster new creative solutions or just to check the availability of the ideas without too much attention to the present organisation implications. Many project leaders interviewed declared that they perceived as “frustrating” the attempts to introduce too many feasibility issues all through out the process as this might split the group in functional parties supporting different technical solutions and limit the overall ability to come up with something that could be agreed upon at group level and please top management.

### **Misconceptions about co-creation and managerial implications**

On the whole, people interviewed showed some common misconceptions about what co-creation is that could undermine its success as an effective managerial tool. In particular, the cultural and organisational implications of the use of co-creation tools in structured and organised environments

were largely underestimated. Many managers perceived the project on the whole as a massive set of brainstorming sessions implicitly assuming that a bottom up approach to innovation would not be feasible for complex and hierarchical organisations. This was evident in the way the evaluated the different projects: in many cases one of the most common area of confrontation with the teams was on their motivation after the project and how they felt. They were ready to recognise groups' efforts in bringing new ideas and less to accept the organisational challenge beneath those ideas. Many managers interviewed interpreted co-creation workshops as tools to motivate more than opportunities to innovate. This perception was very much depending on the idea that innovation is a technical and elitist process involving specialised personnel. On the other hand, workshops were described by participants as a cost reduction solution from company compared to traditional innovation tools and processes. This meant that also their commitment should be proportional to the overall perceived investment. The reason of this belief was, again, related to cultural and organisational dogmas that drove their behaviour in the past. Their adhesion to the project was enthusiast but somehow suffered this cultural bias.

Co-creation literature has two main domains: design tools and corporate strategy. The first one refers to the quality of the tools that better support co-creation processes, while the second highlights the competitive advantages that could be derived by the engagement of "collective brains" in the innovation processes. The cultural and organisational studies are not equally developed on the subject of co-creation while it appears that co-creation has a strong impact on the way organisations work and define their role and values . The attitude towards this fact is very often over simplified with a simple suggestion for companies and managers to "think out of the box" (Prahalad, 2004), without taking into consideration the cultural and deep organisational implications of such a stance. Most of the cases of co-creation reported in recent managerial literature (e.g. Ramaswamy, 2009; Rawley et al., 2007) are based on the assumption that while managing workshops and other kind of initiatives employees will somehow automatically learn the new rules of the game and accept them implicitly. As highlighted in the case described in this work this is not the case as many organisational implications related to the dimensions of risk, power and roles are involved in co-creation activities and might seriously undermine their effectiveness.

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# Co-design for accessibility in academia for Deaf students

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## ABSTRACT

*Learning opportunities for students with diverse needs in higher education have increased in recent decades. Consequently, university faculties need more evidence-based information about how students with diverse needs make the sense of the curricula. This paper presents findings from two co-design projects made at the Aalto University in collaboration with Deaf communities. It argues that the involvement of Deaf users in the design process can produce better digital environments in terms of (1) creating visual approaches designing interfaces and (2) providing new tools that advance the user experience of many other user groups such as dyslexic students and visual learners.*

## KEYWORDS

*Co-design, Accessibility, Collaboration, Higher Education, Inclusion, E-learning*

## INTRODUCTION

Learning opportunities for students with diverse needs in higher education (HE) have increased in recent decades. Consequently, university faculties need more evidence-based information about how students with diverse needs make sense of the curricula. Recently our ideas of design, learning and possibilities for the knowledge building have drastically changed, but the higher education in many countries has remained the same for centuries (Raika 2011). Students of higher education arguably take too many years in acquisition-oriented studies without developing their own undertakings, which would genuinely advance their knowledge (Mandl, Grüber & Renkl 1996).



A person with disabilities (PwD) in HE is considered as a student with “special needs”. In this article, we use a term “diverse needs” instead to address the fact that the question is about diversity rather than just needs that differ from what is considered normal or typical. Designing enabling environments rather than concentrating solely on special education and services could promote this. Thus, a holistic approach to inclusion is needed that perceives the students – regardless of their disability– as active members of the academic community of practice.

In HE context technology-enhanced learning environments provide new tools and practices for learning. These environments make it possible to take into consideration the individual needs of the diverse students and give them more opportunities to participate in higher education. We argue that this goal can be achieved through co-design that typically aims to re-focus the diverse objects of activity towards shared outcomes, producing communal artifacts for all stakeholders. We will use the term ‘co-design’ to cover co-design, participatory design and some methodologies of user-centered design although we are aware of the differences between these various methodologies in present design research. According to Kuutti (2007) an interesting development is happening within the academia itself, which seems to be pointing in a direction where existing disciplines imitate the design way of producing knowledge. Hence, we clearly need to consider models that advocate more contextual, situated, and nuanced understanding about the diverse needs of students.

In this paper, we will focus on students who use Finnish Sign Language in university studies. We will present findings from two co-design website projects made at the Aalto University in collaboration with Deaf communities. The first case is the CinemaSense (2000–2004) project, a participatory action design project with Deaf university students. The second case is the Knack project (2008–2009), a participatory design research with Deaf participants to improve user experience of Deaf related websites. Both projects were executed iteratively and in collaboration with users, designers and researchers, both claiming a much stronger visual presence than was habitual in the web platforms of their times, defending the right to pack information and communicate using a Deaf perspective.

The projects demonstrated the importance of involving the users as participants throughout the design process, and thus, the significance of co-design with Deaf communities is further examined. We propose that similar methods can be applied in the production of multi-modal web courses, interfaces, and services that, for their own part, promote inclusion as well as multi-cultural and flexible university studies.

## THEORETICAL BACKGROUND – INCLUSIVE TECHNOLOGY ENHANCED EDUCATION

Designers have noticed the usefulness of inclusive co-design for everyone: good design challenges the old paradigm of “special needs”. Involvement of user communities is especially important when services and products are developed for purposes of inclusive education (Keates & Clarkson 2003). Carey (2005) summaries that all the components for effective accessibility in converged digital data ecology do exist, but they need to be creatively combined, that is, designed. ‘Design’ refers to planning, shaping, giving form, and developing a product or a service. It not only involves the design of an artifact, but also exploring, testing, and cultivating social systems and practices related to the use of the artifacts; hence the latter processes may be considered as an essential aspect of designing.

Due to the diversity, it is difficult to create content that is accessible for all without providing flexible learning environments. For instance, a solution designed for a blind student may run counter to the benefits of a deaf or dyslexic. This is why the students should be allowed to participate in the design process of these environments. We argue, that through co-design we can take into consideration the diverse needs of participants and reveal the tacit knowledge involved that is not directly detectable by any external observer.

Bad usability and user experience can make learning agonizing. User experience is essential part of good design and effective accessibility. In order to enhance user experience, it is important to identify the features that are likely to facilitate product acceptance. This includes respecting users and commitment to user needs and desires. Krippendorff (2006) argues the need for a semantic turn in design and proposes that design involves an “understanding of the understanding of others”. The large majority of research concerning interface design for “disabled” people, including non-sighted and Deaf users among others, takes the assumption of deafness as a medical disability for granted. Research in the area lacks the examinations of the relation between Deaf people and interfaces in their social context; that is, how Deaf people constitute meanings, how these meanings affect interactions, and how to organize the content in the way that reflects the world as Deaf people perceive it (Woolley 2010).

The design challenge for CinemaSense and Knack project was to create conditions for the objective study of a subjective topic, that is, how Deaf users evaluate websites and how web based course material should be structured. We used co-design as a formative intervention (Pullin 2009) to

give space to Deaf expertise and open up a way to build motivation, or more appropriately, to turn motivation into agency. Naturally Deaf people are the experts in their own motivation, including critical awareness of factors that prevent or distort their motivation to learn or use websites.

## CINEMASENSE – A COLLABORATIVE EFFORT TO LEARN FILM WITH DEAF STUDENTS

CinemaSense is a user-interface of collaborative learning, web-based study material, web portal, and service. It was both the aim of the study, one of its methodological instruments, and the most important outcome of the project, i.e., an independent design artifact for its own sake. The research and design process of CinemaSense is reported in detail in other articles (Raïke 2005; Raïke, Botero & Rodríguez 2003; Raïke 2006; Honkela et al. 2000; Raïke & Hakkarainen 2009); the present chapter focuses on examining the role of Deaf participants who had an essential role in the iterative development of CinemaSense. The project, qualitative in nature, was realized already at the beginning of 2000 (Raïke 2006). Instead of "a rigorous educational film program" for Deaf schools, the CinemaSense co-design project was realized with future Deaf class teachers and potential Deaf and hearing filmmakers and students of art in higher education. Instead of an educational film program a visual educational web-based learning tool was created that, after a decade, is still in use as an open access study material (<http://elokuvantaju.aalto.fi>, Figure 1).



**Figure 1. The CinemaSense learning module El Doble with Colombian Sign Language. Colombian Sign Language signs are provided for concepts explained in Spanish. The signer is Colombian fashion designer Andrea Rodríguez Escudero. The signs were selected and translated by Deaf media professionals ([http://elokuvantaju.aalto.fi/spanish/authors/colombia\\_team.jsp](http://elokuvantaju.aalto.fi/spanish/authors/colombia_team.jsp)).**

The co-design part of the project in 2000–2001 aimed, first, at examining how inclusive art studies can be implemented in practice and how to support the accessibility of film studies (Raike 2005). The second aim of the CinemaSense project was to analyze the Deaf students' knowledge building and conceptualization related to film expression, as well as their collaboration during the web-based course. The third aim was to analyze how the imitation of professional production of a documentary film facilitates the development of CinemaSense: How does the overall film production from an idea to finished product become structured through web-based learning so as to fit the three stages of film production, i.e., pre-production, production, and post-production? Participation in genuine film production was intended to guide participants in problem-driven learning in which each student may assume an expert's role and engage in solving corresponding problems in practice.

In developing tools for collaborative learning, one cannot advance straightforwardly from idea to their implementation; a more complex process is needed in which ideas and visions co-evolve with the experiences and practices of the user communities involved (Greenbaum & Kyng 1992; Engeström & Middleton 1999). Thus an essential aspect of processes of CinemaSense kind is their iterative nature where the formative intervention overlaps with the production. One of the methodological challenges was to examine how the accessibility of academic studies in an artistic institution can be elicited. What kind of methods and services are needed to make basic film studies accessible to Deaf students? Toward that end, the CinemaSense project involved parallel pursuit of developing the web service and analyzing the conceptualization of cinematic expressions with the help of two student groups.

The first 'Novice Group' consisted of seven Deaf class teacher students who engaged, during 2000–2001, in a two-year web-based study concerning cinematic expression, culminating in 2002 making their own documentary film. There were six out of seven participants who considered themselves Finnish Sign Language (FinSL) users whose second language is Finnish; the seventh participant was also confident with FinSL. The 'novice' participants were majoring in education and aiming at becoming class teachers at the primary level of education, after getting their master's degree based on five-year study.

The 'Expert Group' consisted of five full-time Finnish-speaking MA film students majoring in film art from the (present) Aalto ARTS. These students aimed at becoming professional filmmakers either as directors, film editors, cinematographers, or producers. After either a three- or five-

year study program, they aimed, respectively, at becoming candidates or masters of fine arts. Consequently, this group was, in a concrete way, intellectually socialized toward appropriating a filmmaker's perspective on film art.

The groups resembled each other in respect of the members' ages ( $M=28$ ,  $SD=26$ ) and number of languages mastered. The diversity of the groups was a consequence of an intentional choice aimed at understanding various aspects of learning film art relevant from the perspective of designing CinemaSense; Raïke (2005) sought to use the diversity as a productive instrument for collaborative learning about film art through enactive filmmaking instead of examining how the Deaf users' learning differed as such from that of hearing students.

The ways the 'expert' participants conceptualized films provided a comparison base for assessing the Novice Group's evolving knowledge and expertise of film art. Using concept maps, two groups' evolving cinematic knowing was examined and utilized while developing the map-like user interface of CinemaSense across three iterative design cycles. During the co-design, the Deaf students analyzed films, wrote about their own experiences, and represented their evolving cinematic knowing through constructing concept maps (Raïke & Hakkarainen 2009).

It appears that, when used in conjunction with collaborative learning environments, web-based study materials, such as CinemaSense, can be productively utilized to support the learners' own knowledge seeking inquiry, driven by their own questions and wonderments, instead of merely to assimilate existing information (Hakkarainen et al. 2004). Hence a collaborative activity itself empowered the Deaf students to contribute in a meaningful way. In addition, Deaf students with a sight-based orientation to the world contributed to a multilayered visual presentation in CinemaSense, which offered a novel insight and option compared with pure textual content presentation style that was dominant in early 2000's.

#### **KNACK – DESIGNING A DEAF CULTURE SPECIFIC WEBSITE WITH DEAF USERS**

Knack is a web design project by the Finnish Association of the Deaf (FAD) in 2008–2009. The [www.knack.fi](http://www.knack.fi) website was part of a larger Osata project run by FAD where the primary aim was to raise awareness of learning disabilities in Deaf and hard of hearing children as well as adults (Rainò 2010). Altogether sixteen members of the Finnish Deaf community (all Finnish Sign Language users) participated in the study. Participants were selected through purposive sampling based on the following: they are

stakeholders of the project; have an interest in the design; and are willing to support and constructively criticize the development. They presented a wide range of Deaf community members whom two were hard of hearing and fourteen were Deaf of which four were dyslexic.

The primary aim of Osata was to raise awareness of learning disabilities in Deaf and hard of hearing children as well as Deaf adults and to promote the new methods of remediation. The *knack.fi* website was designed to encourage Deaf and hard of hearing children to explore rhythmical plays and exercises based solely on visual and kinesthetic impulses. The multisensory training of rhythmic increases attention and develops early reading and writing skills but it is considered beneficial even for dyslexic adults (Overy 2009).

The study aimed to understand the implications of Deaf culture and Finnish Sign Language as a first language on web user experience. The main driving force to this applied research was to tackle the problem of Deaf users being unsatisfied with sites that are designed for them. Even websites that meet the accessibility criteria – and sometimes them especially – did not seem to attract Deaf users. When interviewed during the preliminary research, a group of Deaf people stated that they are unable to engage with most websites for three reasons: firstly, they were not in their own language, secondly, accessible sites look boring and ugly, and thirdly, they did not feel at home when using them.

In the course of the research, co-design research methods were used to help in understanding the ‘native’ point-of-view. The design process involved three main phases: (1) contextual inquiry through observation and stakeholder meetings; (2) the identification of Deaf culture specific design features through a focus group session, card sorting, and thematic interviews; and (3) the integration of the identified design features by way of a brainstorming session, two collaborative workshops, and development of prototypes in collaboration with Deaf designers. Ideas and experiences from every session were fed back into the following workshops and finally into the development of prototypes. The purpose of the study was not to research quantitative or an object research ‘truth’ in its traditional terms, but rather to look for inspirational and actionable insights on culturally rooted conventions that influence user experience.

The participants emphasized their frustration with the long paragraphs of text, lack of images, slow uploading times, and overly textual navigation. Even if the participants were overwhelmed by text, some stated that they preferred text to sign videos: One has to wait for videos to stream; text on the other hand can be scanned and read quickly. Most participants,

however, would prefer signed communication to text if available. All the participants used both mediums and expressed that the one they used varied from day to day.

To make a distinction between participants' favorite websites and the ones they used in practice, it became evident that the most used sites were news portals, designed for hearing people. However, when asked about sites that brought them enjoyment, paradoxically, they showed the examples of sites targeted towards Deaf users. Most participants said that they would visit Sign Language websites if they were better designed and offered content that interested them. The dialogue below illustrates that also the characteristics of the signer were important for Deaf participants:

*"I like the French site. Let me see if I can find it. Here it is. You see. The signer is engaging and funny, interesting to follow. I also like the symbols they use for navigation. It's easy to explore even if I don't know any French. The way the signer is placed on the site is also different to what one normally sees on a website. Mew... I don't like the way it's inside that box though."*

*"Yeah, I don't like that either. You know the site... wait a moment. Here it is. This is a Finnish site. I like that the man is standing there freely. Though he is too small in size. It's hard to follow. But somehow it feels like it belongs there. It tells you what is there. I like that. But otherwise there is too much text on the site, and I don't like the colors. They are boring."*

Following this line of thought later in the study another participant stated:

*"... Expressive. The signer needs to be lively, creative. Humor is always good. Not too serious. There should be some kind of liveliness."*

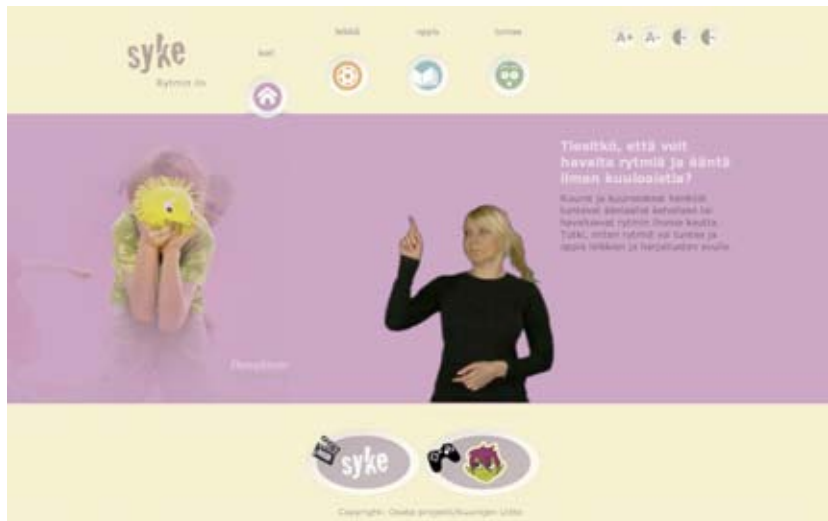
In addition, the visual surrounding was an important part of the design for the participants as the following comments from different participants during a workshop session illustrate:

*"The signed videos with plain backgrounds do not invite to follow what is being signed."*

*"Blank backgrounds do not even arouse my interest to follow the signing."*

The following summarizes the focus group findings in which seven recurring themes could be identified: these were (1) simplicity and clarity; (2) visual guidance; (3) vividness and engagement; (4) charismatic signer; (5) non-isolated signer; (6) the clarity of the signing; and (7) the speed of the website. The design process showed that even if visually engaging content was the key to liking an interface, ease-of-use and speed were as important factors for Deaf participants. A signer on a website did not only bring

functional value as such but it brought added value by giving access to their mother tongue. In addition to Sign Language content, participants yearned for visual guidance such as icons on navigation; photos to illustrate the context of signing; colors to visually differentiate different sections of the site; and visual responses to mouse movements (Figure 2).



**Figure 2. The user interface of Knack website gives visual feedback to its users through color coding and animated icons.**

Even if many of the findings are in line with general usability guidelines, it is important to realize that the needs of Deaf users differs somewhat from mainstream users. Even though Deaf people do not face as strong physical barriers in accessing content as blind and vision-impaired people do, there are mental barriers that may be as limiting. For example, the lack of confidence in writing skills may prevent people taking part in text-based discussion forums; inability to use one's mother tongue may cause frustration; and unclear guidance may prevent people using the site. Additionally, the style in which information is told is important to Deaf users: it determined their willingness to explore the site.

Some of the findings may also apply to hearing people; thus, they should not be treated as a list of differences but rather as a list of issues to be considered when designing for the Deaf community. The design research suggests that the visual features of an interface may be even more important for Sign Language users than for mainstream users. Consequently, they have a smaller tolerance to visual clutter (Rosenholtz, Li & Nakano 2007) and discontinuity in design. This may also bring a new perspective designing for other user groups such as for elderly and dyslexic users who are visually oriented due to short-term verbal memory.



The term 'accessible', in this case, has been diverted along with the Deaf co-designers to mean something unexpected: added visual aesthetics and moving images on the one hand, and partially text-based information even for dyslexic Sign Language users, since signed information may not always be optimally memorized. This collaborative activity brought about new perspectives in accessible web design: accessible web portals should not automatically mean 'boring, stripped-down information' with no images and movement as it often is today.

## FINDINGS AND CONCLUSIONS

Despite the design challenge of creating accessible user interfaces, the needs and requirements of inclusive education have been theoretically examined (Adams & Brown 2006; Riddell, Tinklin & Wilson 2005; Seale 2006) and technology needed for the practical implementation is already available. The iterative collaboration with Deaf students revealed how the accessibility of tools and technology is indeed the issue for effective collaboration (Woolley et al. 2010) and learning.

Simultaneously, CinemaSense and Knack aimed at creating a set of visual web-based study material. CinemaSense helps in understanding film as a product of cultural – even a transcultural – activity. In the case of Knack, a pilot website was created as a hypothesis of the kind of interface that is enjoyable by Deaf community based on their ideas developed in workshops. The results of the co-design projects are closely tied to the opinions of Deaf users. There may be several issues that the studies have not touched upon; the co-design methodology relies solely on participants to bring about the issues they are concerned with. Nevertheless, agendas given by members of the culture are ones that they are concerned with, and thus, important to them. Thereby, it can be assumed that the results can contribute to the processes of designing accessible learning environments in the future.

We are convinced that it is essential to understand how Deaf students, as visually oriented people, conceive of learning, knowing and collaboration in order to promote efficient approaches to learning and tuition in all levels of education. Raïke (Raïke 2005; Raïke & Hakkarainen 2009) revealed how the accessibility of communication tools and technology is indeed the issue for effective collaboration. Moreover, Kitunen (2009) claims that – in addition to accessibility – the design process needs to understand the cultural needs of Deaf users that cover both visual and functional aspects of such tools.

The aim of a co-design project is typically to re-focus the diverse objects of activity within such practices towards shared outcomes, producing

communal artifacts for all stakeholders. Involving Deaf users in the design process we can produce better digital environments in terms of (1) creating visual approaches designing interfaces and (2) providing new tools such as video based discussion forums that advance the user experience of many other user groups such as dyslexic students and visual learners.

Obviously the issue is not so simple and actors in education should consider more the role of learners' activity as an essential part of developing learning environments for Deaf. Hence, actors need to be concerned about the possible benefits of conceptualization in the Deaf way, given the importance of divergent thinking for creative tasks. This in turn augments Deaf professionals' abilities to interpret and evaluate any information and to make decisions vis-à-vis the multifaceted problems of the world.

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# Creativity of an Expert in Building Breakthrough Success

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## ABSTRACT

*To become the best in the world is important in many fields of life as competition has become global and the winner clears the table. For this reason individuals as well as teams are seeking the ways to do something different than others and use the resources available to gain competitive advantage. This study looks at a field where competition has been global for decades. This ongoing qualitative study tries to unfold, using grounded theory, how and why multiple Olympic champions came about to do things differently, furthermore how and why they adjusted the common way of doing, found the competitive edge and became unbeatable. Generally experts' creativity has been studied quite little in the area of sports. This conference paper concentrates on the coach's input in the creative thinking process of champions and their team. The ongoing study preliminarily suggests that new ways of doing is a combination of developed insight, inner drive and persistent work. The study hopes to shed light to any expert and team in search for a winning edge.*

## KEYWORDS

*Creativity, expert, success, coaching,*

## 1 INTRODUCTION

Creative thinking is on the shopping list of many organizations and individuals trying to compete in global or even local rivalry. Scientists have tried to capture the process of creative thinking using anecdotes, historical accounts of creative achievements (Csikszentmihalyi 1996, Gardner 1993 Stenberg & Lumbart 1991), convergent strategies (Locher, 2010, Runco 2007, Kozbelt 2006), and neuroscience (López-González & Limp 2012). Neuroscience has shown that creative thinking is not mystical but an interaction of cognitive abilities such as reasoning, representation, association, working memory, and self-reflection. In creative thinking ideas, knowledge and past experiences are combined in the brain in new ways bringing new possibilities and solutions in consideration (López-González & Limb 2012).

Many scholars have found that expertise and creativity are closely associated (Ward & Kolomyts, 2010, Kozbelt, Beghetto & Runco 2010, Kaufman & Beghetto 2009, Weisberg, 2006, Gardner 1993). Despite this, expert studies have covered creativity only slightly and vice versa. Ericsson (2009 p. 423) notes, “We still inadequately know why professionals differ so greatly in their achievements.”

Hristovski and his colleges (2011) found lately when studying sports that exploratory activities led to creation of new opportunities for action. This study in hand tries to capture how creative thinking is linked to the development and learning process of becoming superior in athletic performance.

Researchers following the development of artistic expression found traits of learning in the process of art making. (Locker 2010, Weisberg 2004). Visual artists seem to have a kernel idea, a “skeleton” that they gradually develop in a creative process: experimenting, thinking and crafting (Koblenz 2010, Weisberg 2004). “Pictorial elements,” and details were added one by one in a process of idea-development and art making. Weisberg (2006 p.767) assumes that also domains such as athletic performance, performance of classical music, and medical diagnosis are more open than many realize.

With Weisberg’s thoughts in mind I wanted to unfold how creative thinking happens in athletic performance. Taking the starting point that the kernel idea of an elite athlete is to become the best in one’s discipline, I wanted to understand how and through which process some athletes become unbeatable.

I suggest that winning an Olympic gold medal several times is so hard and exclusive that these individuals and their teams must have done something special. I believe that by studying them we can learn something new about experts’ creativity. Following Gruber’s (1982, p. 15) notion that “if we want to know how people become extraordinary adults, we can start with some of the later and then try to find out how they came to do it”. In this study, I interviewed multiple Olympic champions and their team members about becoming better than others, which factors had led to doing things in their way, did they do something differently from others, and if they did, how did they come to do it that way.

I especially take the collaboration between athletes and their coaches in the loop and look at how coaches influence athletes’ thinking.

## 2 BACKGROUND

People have enormous individual differences in the amount of creative outcomes and contributions (Ward & Kolomyts, 2010). Kaufmann and Beghetto (2009) distinguish four levels of creative magnitude: mini-c (personal), little-c (everyday), Pro c (professional doing incremental shifts), and Big C (eminent, moving to new areas). Csikszentmihalyi (1996) explained Big C creativity to be a process where one comes up with a new idea and the field accepts it to be a novel idea. The line between c:s is anything but clear. In this study, I look at very skilled individuals, the Pro c-ones, and try to understand what role creativity plays in their success.

### 2.1 Creativity

“Creativity is an attribute of ideas or products that are original or statistically infrequent, and therefore unpredictable, in a given culture”(Csikszentmihalyi, 1994, p. 299).

To make something work in a novel way requires lots of effort and therefore one could state that in the creative process hard work is mandatory.

Therefore, growing to be an expert is a part of executing creative ideas.

Csikszentmihalyi explains (1996, pp. 1):

“Genuinely creative accomplishment is almost never the result of a sudden insight, a light bulb in the dark, but comes after years of hard work. “

### 2.2 Expertise

Becoming superior one needs to build beyond the existing experts, blend a unique cocktail of knowledge and put that into practice. Through a coach in deliberate practice an athlete takes advantage of the accumulated knowledge of previous generations concerning optimal training (Weisberg, 2006, Hodges, e al., 2006, Ericsson 2006, 1999).

Weisberg (2006) explains: “Deliberate training is the foundation of expertise, which, in turn, is responsible for consistent high-class performance that is creative”. Also deliberate training is creative as by only following the existing patterns one can get as good and far as others. Learning compactly from the past frees time for new development.

However, one needs motivation to look for new solutions. In general, people tend to use mainly what is called ‘system one thinking’ (Kahneman, 2003), which refers to using ready solutions and saves our energy. A person

has to be motivated (Amabile 2012, Ryan & Deci 2001) to use system two thinking. Deep thinking takes a lot of time, effort, and energy.

However, questioning the current way requires a highly sophisticated understanding of the critical factors needed and the nature of the skills required (Hodges et al. 2006) making the change. One has to build understanding in order to see what is missing or what could be possible. Yet, knowledge is scattered all around also in other fields, and it needs to be seen, found, and matched to existing comprehension in the core field.

Cook and Brown (1999) called this kind of knowledge investigation as “productive inquiry”, where one deliberately (though not always consciously) seeks what is needed to improve. “Productive inquiry” and looking for solutions is central to creativity, but to know what to look for is neither clear nor simple.

Lots of interest has been on knowledge transfer and new knowledge creation (Nonaka 1994, Cook & Brown 1994, Nicolini 2011). Knowledge is constructed and negotiated through social interaction in localized social situations and practices (Nicolini 2011). Therefore, people’s knowing can only become a tool when the people interact within the context of a specific piece of work (Cook & Brown 1999). The interest here is, how new knowledge and knowing are built in interaction between a coach and an athlete as a “generative dance” (Cook & Brown 1999) for growing process of ideas and understanding.

### **2.3 Ability to Reflect**

Athletes master their performance and use their body as a tool for this. The ability for deep reflection is therefore one of the core abilities to become an expert and to develop beyond the fields of other experts (Sydänmaanlakka 2007, 2003,). An athlete or any performer has to combine external knowledge with internal knowledge and build from there a solution that he can master. An athlete needs to have a very good understanding of the foundation of what he is mastering. However, after the very holistic self-consciousness, the feel “what I need to do” can be done almost intuitively. As Seung’s (2008) research shows, the linkages in our brains have created through countless experiences of determining what we do and even what we think.

Top athletes are masters at practicing, but why do some become superior whereas for others improvement seems to stop? In this research, I am looking for disruptions from common ways of doing and if there are some conditions, triggers and enablers that made improvements possible.

### 3 STUDY ON OLYMPIC CHAMPIONS

#### 3.1. Data

Data for this study was mainly gathered by interviews of all multi times Olympic Champions in Finland who had won more than one individual gold medal at the Olympics plus people important to their thinking and success. After the beginning of 1970's, there have been five such individuals in Finland.

Studying Olympic champions provides a researcher an extreme case (Yin, 2009, p. 47) as strive for being unbeatable is in the foundations of Olympic sports. In sports, uniqueness in global competition is measured in an established way, which gives for this study a ready process for identifying the specific people, relying other experts' judgment (Sosniak 2006, p. 293).

In this study, a 360 degrees study is done to gain a rich picture and to produce a comprehensive understanding of the past incidents. For this purpose, I have asked each athlete to name individuals who have been in a key role during his career. From key persons additional interviewees were asked by using the snowball technique (Goodman 1961).

In this paper, I am concentrating especially on the coaches' role as a co-creator. By now, I have interviewed four athletes and five coaches. In addition, I have used a book written by one of the coaches explaining his methods and role in creation the four times Olympic gold medalist.

#### 3.2. Grounded Theory Approach

Grounded theory fits well to identify patterns from the data (Edmondson & McManus 2007). Additionally, the method has been largely accepted and regularly used by researchers doing inductive qualitative research in social sciences and organizational research (Bryant & Charmaz 2007). This method provides a suitable tool to move systematically from data to abstract constructs creating concepts, and relationships between them. As I had much pre-knowledge of the area myself being previously a top athlete, I needed a very structured way of analysing in order to be "sincere" (Tracy 2010) and to separate my own thoughts from the data. I followed Corbin and Strauss' (2008) approach and their practical guidelines in the process.

In the semi-structured interviews, I used the laddering technique (Reynolds & Gutman 1988) going deeper and deeper in the topic that felt interesting and relevant to my research question. The interview language was Finnish,



the native language of interviewees and myself. To keep the data as original as possible, it was only translated to English for the quotations used in this paper.

I recorded and transcribed the interviews and then coded the data, both interviews and the book, first using in vivo coding and then second and third level coding (Corbin & Strauss 2008, Strauss & Corbin 1998). The abstract labels that I created were grouped together following Corbin and Strauss' (2008) advice for a process.

At first, I looked for a pattern of success, and then I went on looking for topics of innovation and creativity even closer.

#### **4. FINDINGS**

According to the preliminary analyses of the data, in these winning athletes' career all seemed to fit into place. They all were suitable for their sport in very holistic way and the surroundings were appropriate for training.

However, idea that with talent and hard work one becomes champion, would give a too simplistic picture about the phenomena. The ski jumper pushed off excellently, but was not the best in world in push off. The runner was not constantly on top of ranking but knew how to run to win. Also surroundings were sufficient but not always optimal. The rower did not have winter training facilities like his rivals in middle Europa and had to find ways to replace rowing. It seems that the success is a combination of many things, and it might not have been found without a careful search. One coach explains:

“I knew that the training goal in top-class sport could not be anything but keep up the pace of development, or rather to be ahead. It was important that we did not start to just follow what the competitors did. We looked for the methods ourselves and when we found them we still looked new ideas to improve them.”

Another coach listed three conditions he sees crucial to succeed in sport:

“At first, the sufficiently good training conditions, to be able to do the named sport in a way that will eventually lead to something. Another thing is the recruitment system that is able to pick-up the motivated and fitting athletes. The third is the coaching that is complex; the coach is not God, who would be able to say what to do. Sometimes coach will give in, and despite of that, the athlete will succeed. If these first two works brilliantly, the third might concede.”

I would argue that this “third element”, coaching is also essential but gained in many ways. Coaching is a collaborative action where knowledge is transformed, and an athlete is prepared through instruction, and experimenting to think and understand what to do. Knowledge gathering is

often gained in bits and pieces during the career and also through seeing, reading, etc. An athlete comments:

“I read all the information about training and also in radio there is a lots of coaching knowledge. In many places you can find information related to training and health.”

#### ***4.1 Coaching Relationship and Knowledge Seeking***

In these four cases, the relationship between a trainer and a trainee differed greatly in intensity. In some of them, the athlete seemed to have been very independent while in, another case, the coach said it was little the athlete rebounded back to the team only being the absorbing side. Even with this athlete, I felt that the he had produced a very clear picture in his head of what was his perfect performance, and what elements were crucial to it. He spent lot of time thinking and “drawing” the picture more and more detailed. His previous coach said he endlessly was challenging with questions:

“He was constantly analyzing what is happening in his performance putting an image together like having video equipment inside his head. That is a feature, which I have not still seen with anyone else, although I have been closely involved with this sport since the 60’s.

It takes a lot of bothering and undertaking to develop new methods and how they can be transformed. Sensemaking (Maitlis & Lawrence 2007) can be done by an athlete, an athlete and a coach, or a coach first alone and then with an athlete. However, the athlete is always needed in the process in some point to make the link between knowing and doing.

“During my career I had these different coaches and I always learned something from each of them. It is difficult to distinguish, how much weight each contact and coach from Finland and abroad had and which was the most important. I think it was a strong rope of many strands.”

The big difference between the four athletes is, how much knowledge seeking did the coach do contrary to the athlete himself. One coach said:

“The coach’s job is to try to understand what is the red thread of the training, the core of the discipline, and how it should be implemented.”

An athlete said:

“As an athlete you must realize that you need to develop your knowledge about the sport all the time in order to know what to do.”

Also the knowledge that an athlete has was somewhat different: the athletes did not have to ponder what others needed to do but they seemed to know exactly what is a perfect performance for them. It seems that athletes’ brain

is coded with movements and deep knowing but not necessarily with words. It was also clear that the coaches could not have the same picture in their heads as the athletes. This is shown in comments like in the following one:

“I don’t know where did the style come from. He probably just figured it out.”

#### ***4.2 The Coaches’ Role in Cooperation***

The coaches did a lot of knowledge gathering and development. For example, the ski jumping coach analysed jumping videos and linked Einstein’s theory of relativity to take off in ski jumping. The newness of the idea expressed threw the scientists at the University of Technology who said the theory does not work, but after experimenting it was later central to one doctoral thesis. The same coach similarly improved jumping suits and brought helmets to ski jumping to increase aerodynamics. He was an experimenter by heart looking at the training in a very all-inclusive way. Another coach said similar things:

” Many coaches try to look at some special detail, where he puts the emphasis on forgetting the most important thing, and that the training is very large and complex, and no aspects can be forgotten.”

And in other place:

“I had sports medical science against me saying that this cannot be done. It was challenging for me. Luckily he (the athlete) was ready to try his limits.”

Knowledge gathering and forming an understanding is the key in forming a unique view and a winning formula. The athlete and the coach seem to have their own roles in the process; however, the line between the roles is blurry. The coach has the weight on being an outside knowledge seeker and an editor, whereas the athlete is using the inner feel, the inside knowledge being the reflector and the linker of the body consciousness and outside knowledge. Roughly saying the coach forms and “sells” his idea, and the athlete takes what fits into his picture.

#### ***4.3 Deep Understanding***

Deep understanding develops as the results of years’ puzzle-like work, with new situations and questions to be answered. Collaboration with relevant people helps and is crucial both for the athlete and the coach in order to add applicable knowledge to unpolished view.

The athletes, I interviewed, lived for their sport, not only when doing the sport but when spending time in reflecting. I have a feeling that they really deeply considered the pieces of the puzzle and got the understanding sharp. One athlete said:

“I concentrated. It is not conscious - it comes day by day over the time. It was the kind of a lifestyle. It is not necessarily physical practice. It is all that time you spend with the sport, fixing the equipment, you all the time work preparing for the training. “

The same can be said about the coaches. They built up their understanding and philosophy over time in collaboration with many people and trying to find solutions to any raising questions. They formed their experience through years of thinking. Like one of the trainer said:

“We developed the training idea for 16 years and then he (the athlete) came.”

It is also essential that these athletes executed the view, did what was needed to be done to excel, often a trainer on the side to support and interpret the experiments. The training was extremely tough, but not whatever training. As a trainer said:

“If a runner trains three times a day, how many overlong running loops can be executed, or powered training to fit in. It might turn out that the wrong dosage of a recovery between the daily exercises makes the runner and coach's job to be void.”

Strong will and solid views, ambition and dedication could be recognized both from all the athletes and the coaches. One coach said:

“After the years pause in coaching I started to coach again, and I was now able to carry out my own four-step process for the training. I did not change anything on anyone's command; I did only what I believed to produce results.”

It seems that the philosophy had been thought many times; both the athletes and coaches had made deliberate choices.

## 5 CONCLUSIONS

In sport, creativity is not in the primary focus: therefore its existence has gained little attention. This ongoing study suggests that the Finnish multiple Olympic champions and their teams needed to act creatively in order to succeed, to choose right training methods, to improve techniques, to trim existing techniques and to bring new equipment to the field. Some adjustments were small, but some even led to a systemic change.

These preliminary findings are in line with the conclusions made in studies on sports' ecological dynamics by Hristovski and his colleagues (2011), study with visual arts by Locker (2010) and the neurological study by López-González and Limp (2012).

The research interest in this ongoing study is to find, how successful athletes have formed their views and the winning edge. No doubt that these

athletes were also working hard and were physically fitting with the demands of the sport; the explanation commonly used. My suggestion is that experimental and open mindset (Dweck 2007), and years of pondering and knowledge adaptation helped these athletes and their teams to build a new logic to training and performing. It seems that athletes had to build “the perfect performance” in their head. The coaches’ role was, in different degrees, to submit building blocks to the picture. The knowledge and knowing between a coach and an athlete was transmitted in practice with experimenting and instructions.

This conference paper gives some idea of the unfinished study. This working paper still cuts corners here and there giving only hints of findings. The plan is, when the study is finished, to get the data more complete and the analyses deeper.

In the past, experts’ creativity, particularly in the areas of sports, has not been studied very intensively. This ongoing study will, when finished, shed some light on experts’ creativity and by so doing help athletes, coaches, elite sporting systems, and others in the search for the winning edge in their specific field.

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# Collaborative Knowledge Building for Accessibility in Higher Education

The inclusion of human diversity on the teaching & learning processes at Aalto University

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## ABSTRACT

*This paper examines accessibility from the point of view of inclusive teaching and learning in the higher education. Instead of focusing on the various disabilities, addressing the needs and the diversity of all students is adopted as a starting point. We present several conceptual tools regarding the process of collaborative knowledge building. Finally, we suggest an iterative cycle of developing inclusive teaching and learning by using a PDCA tool with the continual iteration on communities of practice level among all stakeholders.*

## KEYWORDS

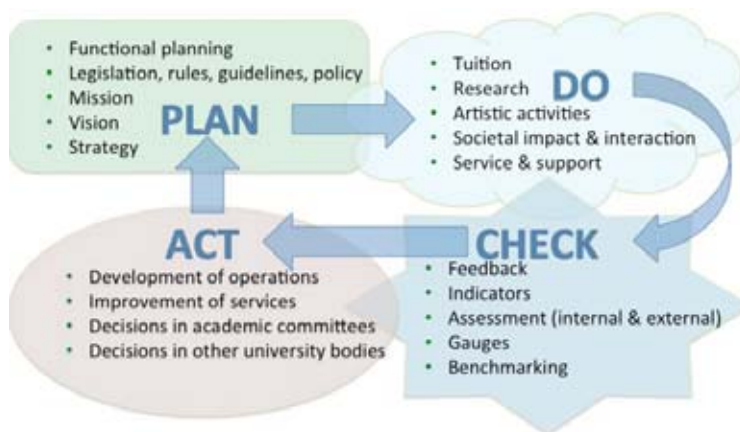
*Diverse students, Inclusion, Knowledge building, Learning*

## INTRODUCTION

In this paper, we will present the frameworks, activity theory, and collaborative knowledge building for practical work to improve accessible academic culture. Thus the objective of this paper is to show which kind of theoretical frameworks may be useful in highlighting the current challenges in higher education (HE) organizations in supporting diverse students' learning. In conclusion, we suggest that these challenges and their solutions found by the stakeholders should be addressed explicitly in the annual planning process of a HE organization. In parallel, we will present a challenge for educators and developers: **How to help diverse students who are able and willing to participate in the creation of new knowledge to develop into active members of academia and the world?**



The success of inclusive HE is influenced by how all the stakeholders within an institution respond to external drivers for accessibility such as legislation, guidelines and standards (Seale 2006c). We divide our paper on three operational domains. 1) Non-discrimination and disability: Accessibility research, in general, focuses mainly on accessibility legislation, guidelines and standards, and the rules contained within them. E.g. The *Finnish Non-Discrimination Act* (21/2004) requires reasonable steps to be taken to help people with disabilities to cope and advance in their career. However, the objective of higher education actors should not be only to comply with legislation but to address the needs of students (Seale 2006a, 2006b). In addition, ‘disability’ is a vague concept in academic context where learning to collaborate and learning from collaboration is a must to all stakeholders. 2) Performance improvement, or quality management, at Aalto University and its schools is based on the PDCA (Plan, Do, Check, Act) cycle (Deming circle), a tool for continuous improvement (Figure 1). PLAN is gathering information on the process and on the basis of that information to plan improvement. DO is simply to carry out the plan, establishing objectives and communicating the change. CHECK means monitoring performance against the plan to ascertain if the objectives are being achieved. ACT means to standardise the changed process once it is in control and it has been determined that it actually delivers the planned improvement. At Aalto University, the practice of reviewing and revising objectives and developing activities is considered a spiral, a continuous process in which each round of development takes us closer to the objectives we have set. 3) Actual teaching, learning, research and artistic activity taking place everywhere on the campus. Diverse stakeholders are faced with collisions of interests and clashes of views almost daily.



**Figure 1: PDCA (Plan, Do, Check, Act) principle for continuous improvement.**

Thus, it is essential to learn how the academic community in its entirety can build knowledge based on evidence (Raïke 2012). We admit that every

student is a unique individual, a learning novice growing to become a master with peers in our community and we seek to support this process in all operational domains. Hence we will use term *diverse students* to cover all students, and propose designing *enabling blended learning environments* (facilities including networked learning) rather than concentrating on special services or disability issues per se. We believe this kind of approach could promote more inclusive strategies for a university. An enabling learning environment would keep the community knowledge building and innovative mind-set alive empowering the whole academic community. We have seen that inclusive research, teaching and learning are relevant for not only “disabled” (the first domain) students, faculty and staff, but for all learners of the community (third domain). The effective use of the quality management (second domain) ensures that the university allows the stakeholders to learn also with unconventional methods or with the language or possible cultural style they do not master best.

## ACTIVITY THEORY

A modern faculty would need more evidence-based information about how the student communities and cultural subgroups make the sense of the diversity of academia. A traditional and tested way to collect the data is to use formative interventions (Engeström 2011) in the recreation of academic policies and culture. The ‘formative intervention’ is grounded in the modern *activity theory* (Engeström 2009) and action research traditions. Here we will use the term ‘co-design’ to cover co-design, action research, participatory design and formative interventions. This paper is based both on the practical collaboration and on the findings from co-design projects made at the Aalto University to promote inclusive and enabling environments, accessible to all students (Kitunen 2009; Raike 2006; Raike & Hakkarainen 2009). In addition, Honkela, Izzardust & Lagus (2012) introduced promising text mining for wellbeing and similar methods for large data sets are easily available for academic institutions.

Three principles of the activity theory are often accepted in co-design research projects: a) People live in a reality that is objective not only according to natural sciences but socially and culturally defined properties as well; b) Internal activities cannot be understood if they are analysed separately from external activities, because they transform into each other. Internalization is the transformation of external activities into internal ones; c) Human activity is mediated by tools in a broad sense and the use of tools is an accumulation and transmission of social knowledge.

Development of inclusion is not only an object of academic study but also a general research methodology. The basic research method is the formative experiment, which combines active participation with monitoring of the developmental changes of the study participants (Engeström 2009). The unit of analysis is *motivated activity directed at an object* (goal). The goal-directed action is conscious and quite often students expose the motivation during the learning activity discussions. Thus the Engeström's model in Figure 2 is useful for understanding how a wide range factors work together to impact an activity.

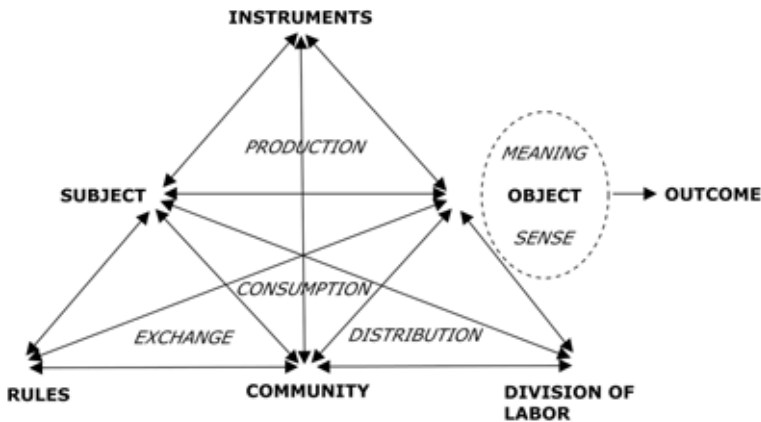


Figure 2: Activity System (Engeström, 1987, p. 78; re-drawn by authors).

In order to reach an outcome like a more accessible workshop for multi-lingual student group, it is necessary to produce certain objects (e.g. experiences, knowledge, and physical products). Instruments (artefacts) mediate the subjects' (stakeholders') activity (e.g. tools used, documents, mobile devices and schedules) with the community (university organization or the student community). Also, the community may impose exposed or hidden rules that affect activity. The individual student as a subject works as a part of the community to achieve the object in this framework (Figure 2). Any activity normally features a division of labour, i.e. the roles of faculty, staff and students.

Engeström (2001) reminds, that the object of activity is a moving target, not reducible to conscious short-term goals. He summarizes the activity theory with the help of five principles:

1. A collective, artefact-mediated and object-oriented activity system, seen in its network relations to other activity systems, is taken as the prime unit of analysis.
2. Activity systems are multi-voiced. An activity system is always a community of the multiple points of view, traditions and interests. The division of labour in an activity creates different positions for

the participants, the participants carry their own diverse histories, and the activity system itself carries the multiple layers and strands of history engraved in its artefacts, rules and conventions.

3. Activity systems take shape and get transformed over lengthy periods of time, that is, the problems and the potential of a HE community can only be understood against the history of university. Thus, educational work needs to be analysed against the history of its local organization and against the more global history of the HE concepts, procedures and tools employed and accumulated in the local activity.
4. The central role of contradictions as sources of change and development. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. When an open activity system adopts a new element from the outside (for example, a new technology or a new object), it often leads to an aggravated secondary contradiction where some old element (for example, the rules or the division of labour) collides with the new one. Such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity.
5. The possibility of expansive transformations when activity systems move through the relatively long cycles of qualitative transformations. As the contradictions of an activity system are aggravated, some individual participants begin to question and deviate from its established norms. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort. An expansive transformation is accomplished when the object and motive of the activity are reconceptualised to embrace a radically wider horizon of possibilities than in the previous mode of the activity. A full cycle of expansive transformation may be understood as a collective journey through the zone of proximal development of the activity. (Engeström 2001).

It seems quite clear in the activity framework that we need to know more about two complex issues if we aim to improve the quality management of the HE with a PDCA tool. First, what type of academic tasks might be the most conducive to fostering the intellectual development of novice students? Second, when can an academic task most effectively be offered to students? The zone of proximal development is determined by the cognitive tasks the learner can first complete in collaboration with an advanced peer but later is able to accomplish alone; the zone of proximal development is

the move from the present level of development to the new potential level of development. However, in the university setting, context intelligence can be seen as an index of what a novice can do and is capable of doing while interacting with experts either in a classroom or using the collaborative tools providing flexible opportunities for advanced collaboration.

## COLLECTIVE KNOWLEDGE BUILDING PROCESS

The multi-voicedness of the academic community is multiplied in networks of interacting activity systems. It is a source of trouble and a source of innovation, demanding the actions of translation and negotiation (Engeström 2001). Engeström (2001) proposes to examine the activity theory and its concept of expansive learning with the help of four questions:

1. Who are the subjects of learning? This includes all the stakeholders if we agree with the principle 'learning community'.
2. Why do they learn? The activity of the community towards an objective (goal) is a result of a motive (need) that may not be conscious.
3. What do they learn? Do they start conscious individual or group action towards a specific goal and sub goals or criticize without collaborative activity for improvements?
4. How do they learn? The operation structure of activity is typically automated in the organization and thus not conscious concrete way of executing an action according with the conditions surrounding the goal.

University students are confronted with a pluralism of values, both in courses and in their interaction with a diverse student body. 'Personal epistemology' describes the critical intertwining of cognitive and affective perspectives as a student develops more complex forms of thought during studies. According to Hofer (2001), personal epistemology addresses students' thinking and beliefs about knowledge and knowing, and typically includes some or all of the following elements: beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs.

Academic activity intensifies at the beginning of the studies when students start to develop personal epistemology to meet the needs of collaborative knowledge building with the assistance of faculty. The practice of academia involves exposing the personal epistemology of the novice for peer review in discussions, joining the academic discourse by learning the necessary

argumentation skills, conceptualizing the discipline in question, and gradually improving knowledge building and other academic skills. Hence the knowledge building is the formulation of personal epistemology to refine knowledge artefacts and address the authentic and complex problems of the world.

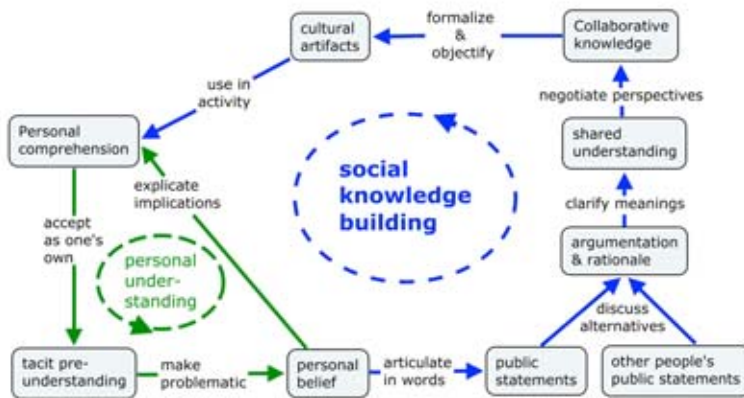
Williams & al. (2010) believe that collective intelligence, defined as the general ability of the group to perform a wide variety of tasks, stems from how well the group works together. According to their research, those groups whose members had greater levels of "social sensitivity" were more collectively intelligent. Moreover, the researchers found that the performance of groups was not primarily due to the individual abilities of the group's members. Williams & al. (2010) hypothesize that it might be possible to improve the intelligence of a group with different techniques: by changing the members of a group, teaching the members better ways of interacting, and giving the members better electronic collaboration tools. Thus, what individual students can do alone is losing importance; what matters more is what students can do with others (i.e., collaboration), especially with the use of technology.

The complex process of growing from a novice to an expert can be supported by collaborative knowledge building activities and practical co-design projects with students. The process of the knowledge building is essentially the same from early childhood to the most advanced levels of theorizing, invention, and design and across the spectrum of knowledge-creating organizations. However, the diverse students should be the experts at their own motivation, whereas the role of the faculty is to turn the motivation into agency (the division of labour). Learning at the collective level is the outcome of the interplay between the individual and collective types of knowledge as they interact through the social processes of collaborative activities.

Figure 3 depicts the knowledge building that starts with individual knowledge and personal epistemology and develops into the ability to argument, to shared understanding and finally to reach collaborative knowledge (Stahl 2000).

One distinctive feature of the knowledge building is that knowledge can be seen as *knowledge artefacts* "existing out there," which have a certain value or function. The view of knowledge as abstract conceptual artefacts created by humans to specify the relationships of other objects, in the form of explanations or theories, originates from Popper (1972). By simulating the culture and practices of expert communities, such as a scientific research

community, novice students engage in a problem- and explanation-driven inquiry (Raïke 2006; Raïke & Hakkarainen 2009).



**Figure 3: A diagram of a knowledge-building process (Stahl, 2000; re-drawn by authors).**

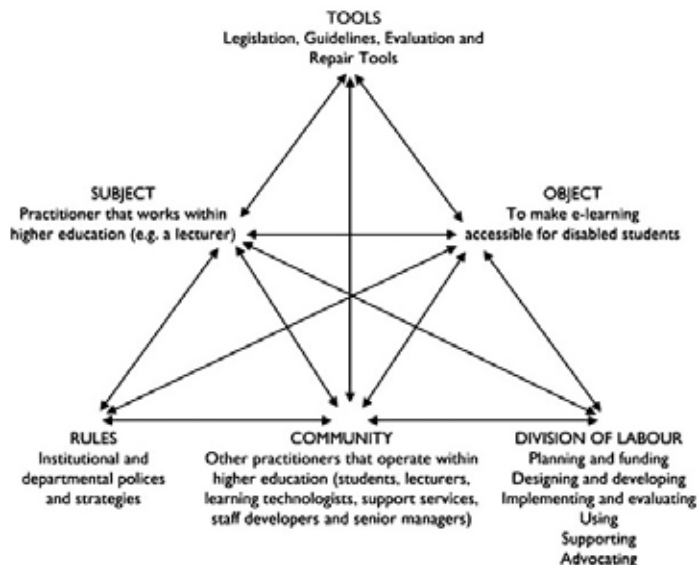
Moreover, in problem-based learning processes, information is treated as something that needs to be explained. Instead of the direct assimilation of the information, students construct knowledge through solving problems in the communities of practice (Wenger 1998). The knowledge artefacts that students learn to use, modify, or create are laden with social and cultural values; these artefacts (technical tools, signs, language, machines, websites and script activities) persist as the structures of mediation in HE.

The knowledge building for accessibility addresses the need to educate both students and staff for a world in which knowledge creation and innovation are incessant. The knowledge building may be defined as the production and continuous improvement of ideas of value to a community, through means that increase the likelihood that what the community accomplishes will be greater than the sum of individual contributions and part of broader cultural efforts. This is the precise reason why we need to understand and modify the administrative PDCA tool in the activity theory framework. The knowledge building in higher education takes place typically in student groups, academic teams, and faculty communities of practice, either in classrooms or using networked learning environments. Within the planned, given and defined learning environment, individuals construct new knowledge in their role as a partner in co-design processes. Thus, a learning environment is not a simple entity that exists independently of its stakeholders; especially faculty need to be concerned about the possible insufficiency of the appointed learning environment where students interpret and evaluate even contradictory information and make decisions vis-à-vis the multifaceted problems of the university and academic studies.

## DISCUSSION AND CONCLUSIONS

We claim that students are not engaged in creative knowledge building for accessibility in a broad sense if they are merely engaged in study attainments and their contribution is limited solely in administrative actions or university management system activities like enrolment on courses and exams, reading various instructions and reporting delay or progress. Thus we need a more holistic approach to inclusion that really perceives all students as creative members of the academic community of practice. Practitioners of higher education should consider the role of learners' motivation and *activity* in the knowledge building process as an essential part of successful blended learning. The evidence indicates that the interaction among the stakeholders like teachers, support services, staff developers and students must be taken into account if we are going to improve the accessibility of academic activities. Same time we will be able to avoid the categorization of people as students with special needs or "different" or "foreigners" and thus subtly exclude part of student communities from creative collaboration.

Seale (2006a, figure 4) has applied Engeström's (1987) systemic model of activity to the accessible e-learning practice of higher education practitioners.



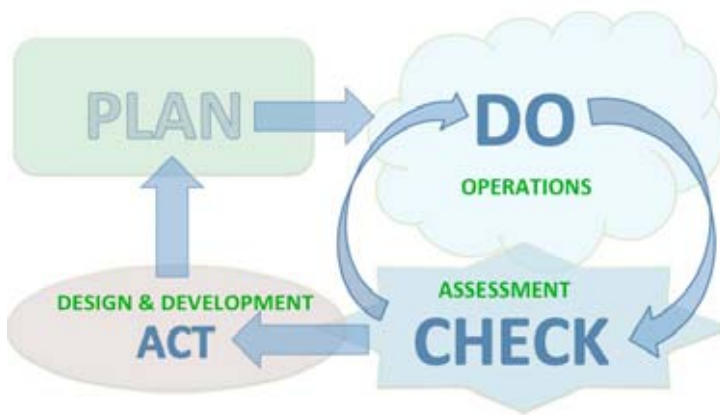
**Figure 4.** Application of Engeström's (1987) systemic model of activity to the accessible e-learning practice of a higher education practitioner (based on Seale, 2006a, 165).

This is practical also for us, because our objective in Aalto University is to develop inclusive blended learning and teaching accessible for diverse



students. Figure 4 depicts the activity system of all the involved stakeholders, where rules and practical issues presented by PDCA cycle (Figure 1) have to be taken into account. We seek merging the principle for continuous improvement with the systemic model of activity to augment the formation of the active academic communities of accessibility practice as a positive outcome.

The PDCA cycle is slightly further modified (Figure 5) when the activities of the academic year and challenges of the personal epistemology with the evolving knowledge about the academic knowledge building are taken into account.



**Figure 5. The modified PDCA cycle for students and staff facing every-day challenges on the campus**

The sub-iteration in Do-Check cycle includes the systemic model of activity presented in Figure 4. The inner Do-Check cycle should be supported by the university management and organized promptly and lightly inside the academic year. This would give a real opportunity for stakeholders to propose improvements and innovations for the next design and development round.

Taking into account the sub-iteration cycle and the more general PDCA-cycle, our recommendations for creating inclusive teaching and learning in higher education are the following:

1. **PLAN:** Analyse what types of academic tasks might be the most conducive to fostering intellectual development. Prepare the syllabus with teachers so that a flexible personal study plan is easy and possible to construct. Contact staff organising first year activities and faculty in schools in order to define the zone of proximal development.

2. DO: Support field-based research to obtain data on the diversity of the student body especially within technologically enhanced learning environments. Collaborate with researchers at your own university. Collaborate also with different service organizations (library, campus and facilities, IT and communication) in order to solve practical issues.
3. CHECK: Evaluate how the earlier experiences and syllabus affect learning within the university. Check and follow how personal study plans work.
4. ACT: Practice co-design methods with students to reveal the social, cultural, and political character of the design process for learning tools.

These rather simple administrative modifications can give voice to the expertise of students and staff and turn student motivation into academic activity with the support of faculty and staff.

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# Emotional capital in the context of online music – bridging emotional capabilities with firm performance

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## ABSTRACT

*Emotional capital (EC) defined as “.. the aggregate feelings of goodwill toward a company and the way it operates” (Huy and Shipilow, 2012) is increasingly important for firms, that pursue success in online music. Until recently, Entrepreneurial Orientation (EO), defined as “key entrepreneurial processes that answer the question of how new ventures are undertaken” (Lumpkin and Dess 1996, Fayolle et. al, 2011) has been widely utilized while predicting firm-level success in mostly non-artistic off-line contexts. However, as Baron (2008), cited in Cardon et. al (2012) highlight affect – the feelings and moods individual experience are central in all stages of the entrepreneurial process. Thus, EO at the level of innovativeness, risk taking and proactiveness is too limited for exploring firm-level performance in music, since it disregards emotions and fails to consider entrepreneurship as human and creative. Drawing from interpretive concept research (Lämsä and Takala, 2004) this study builds on EC, EO and emotional capabilities constituting a resource inherent organizational development and take part in social cohesion, to social and economic success (Gendron, 2004, 2006) As to conclusion this study highlights that success in online music happens only after the emotional capital has been built (Huy and Shipilow, 2012).*

## KEYWORDS

*Emotional capital, Emotional Capabilities, Entrepreneurial Orientation, Firm performance, Online music*

**”Digital behavior is just a replication of human behavior.”**

-Paul Papadimitriou, Digital Intelligence Analyst

## INTRODUCTION

Emotional capital has recently been recognized as a central component of organizations' success and survival both offline in today's increasingly complex global workplace (Gendron, 2004, 2006) and online (Huy and Shipilow, 2012) in the digital space. Emotional capital, as defined by Huy and Shipilow (2012):

“.. the aggregate feelings of goodwill toward a company and the way it operates“

has been shown to be essential for organizations facing business changes (Gendron 2004,2006) and pursuing new opportunities in the new business world. In addition, it has been observed (Huy and Shipilow, 2012) that emotional capital is a crucial component for internal organizational success in the digital space, more precisely social media success within organizations calls for a leader who can build emotional capital and values community building as a means of creating economic value.

Until recently, success of born globals, international ventures (Zahra 1991, Wiklund 1999) and high tech SMEs (Aloulou and Fayolle, 2005) has been widely explored through Entrepreneurial Orientation (EO) theories in mostly non artistic offline context, leaving the related field in online music almost untouched. Thus, Entrepreneurial Orientation, a key construct in entrepreneurship, defined as (Lumpkin and Dess, 1996, Fayolle et.al, 2011)

“.. key entrepreneurial processes that answer the question of how new ventures are undertaken ”

serves as an adjustable theoretical vehicle to draw from in predicting success in the current research context; online music. As the word ‘context’ literally refers to the circumstances in which an event occurs; a setting, the context of online music is regarded as the environment or circumstances such as internet website, in which digital music or music related digital product is created, presented and distributed. However, since existing EO model, at the heart of strategic decision making is mostly quantitative and analytical by nature, it fails to embrace entrepreneurial process as human and creative (Zahra & Bettinelli, 2010). Thus, EO at the level of innovativeness, risk taking and proactiveness is too limited to explore performance in music driven digital space, which calls for viewing successful entrepreneurial processes as improvisational co-creative process, where temporal, emotional and connective contexts are integral (Zahra & Bettinelli, 2010). The lack of consideration of emotions in previous conceptualizations of EO, which underrepresent the role of affects in the successful entrepreneurial act (Goss, 2005, Yitshaki and Rothstein, 2010), calls for additional elements to be interlinked with performance in online music,

leading to the following research questions:

RQ1. What lies beneath successful entrepreneurial performance in the context of online music?

RQ2. How can the integration of emotional capabilities, music driven soft innovation and entrepreneurial success be captivated in a frame of reference?

The answers to these questions begin to enrich and clarify the discussion surrounding challenges affecting performance in music driven industries, shed new light on the human and creative side of the EO- performance relationship and introduce emotional capital as a complementing theoretical component in predicting firm success in the music driven digital space. (Huy and Shipilow, 2011). These questions are particularly relevant because the ability to draw from emotional capabilities is at the heart of human creativity and thus act as fuel in creative entrepreneurial processes, enhancing new venture creation. The reminder of this study is organized as follows. In the next section, the theoretical background, more specifically the concepts of EO, emotional capital and soft innovation are explored. This is followed by methodology and data section, which draws from carefully selected elements from interpretive concept research (Lämsä & Takala, 2004). Afterwards, findings are served through a new framework, which introduces the concept of emotional capital to the field of entrepreneurship and aligns emotional competencies, EO and firm performance harmoniously together. Thus, this study begins to fill the void created by the lack of affect in firm performance theories and joins call for more attention to affect and ability to lead and the impact of the relationship on the venture's chances of success (Yitshaki and Rothstein, 2010). The final section concludes with contributions and suggestions for future research.

## THEORETICAL BACKGROUND

Since entrepreneurial success in online music is linked to multiple bodies of knowledge, that belong to different disciplines (Yosef, 2009) and since there is no fit theory available, this study draws from Entrepreneurial Orientation (Lumpkin & Dess, 1996, Fayolle et. al 2011), Emotional Capital (Huy & Shipilow, 2011, 2012) and Soft Innovation (Stoneman, 2010) and presents the essence of each in the next section.

### **Entrepreneurial Orientation - theories**

One sub genre in the domain of entrepreneurship drawing from the soul of contingency theory is Entrepreneurial Orientation (EO), which has received a substantial amount of theoretical and empirical attention (Rauch et. al, 2004, Covin et. al, 2006) for almost four decenniums. This study adopts

following EO definition (Lumpkin and Dess, 1996, Fayolle et. al, 2011)

“.. key entrepreneurial processes that answer the question of how new ventures are undertaken”

The discussion regarding EO dimensions has been lively for almost four decades. This study adopts following definitions (Borch et. al 2011):

**Innovation** refers to a willingness to support creativity and experimentation in introducing new products/services, and novelty, technological leadership and R&D in developing new processes

**Proactiveness** is an opportunity seeking, forward-looking perspective involving introducing new products or services ahead of the competitors and acting in anticipation of future demands to create change and shape the environment

**Risk taking** means a tendency to take bold actions such as venturing into unknown new markets, committing a large portion of resources to ventures with uncertain outcomes, and/or borrowing heavily

Until now, only few studies have coined the concept of EO with creative industries. An exploratory study (Alexopoulos et. al, 2004) has characterized the extent to which Australian music recording companies were entrepreneurial. A profile of success factors of best practice firms was delivered: 1) intimate knowledge of market, 2) comprehensive network of contacts, 3) exceptional product quality and innovation, 4) internationally orientated strategy and 5) label recognition. Whereas Parkman et. al (2011) explored the mechanisms that align EO and innovation capacity in creative industries and concluded that EO, which has been shown to influence firm performance heterogeneity in a multiple industry context influences similar tendencies in creative industry. Moreover, it has been argued that firms must focus their artistic, creative and innovative capabilities toward commercial opportunities to be successful (Parkman et. al, 2011). However, EO per se is too limited to study firm performance in online music, since the entrepreneur like the artist, must be able to evoke and manipulate emotions (Zahra and Bettinelli, 2010).

### **Emotional Capital -theories**

Emotional capital has been shown to be essential for organizations facing business changes (Gendron 2004,2006) and pursuing new opportunities in the new business world. More precisely, it has been suggested that this psychologically based capital should be included in decision making

processes just like cognitive reality since emotions and feelings are present even in the most rational decisions (Gendron, 2004, 2006). In addition, it has been observed (Huy and Shipilow, 2012) that emotional capital is a crucial component for internal organizational success in the digital space, more precisely that social media success within organizations calls for a leader who can build emotional capital and values community building as a means of creating economic value. Thus, ability to extract new economic value from emotions is increasingly important for firms, that pursue success in digital space, where the ability to inspire is the key. Therefore, this study aims at highlighting the role of emotional capital in entrepreneurial success and draws from Huy & Shipilow, (2011), who observe:

To be successful, internal social media initiatives must focus first and foremost on the development of emotional capital, which was defined as the aggregate feelings of goodwill toward a company and the way it operates.” (Huy and Shipilow, 2011)

In parallel with Huy and Shipilow (2011) this study highlights that firm success in online music happens only after the emotional capital has been built. As pointed out by Huy and Shipilow (2011) the pillars of emotional capital are: 1) Authenticity, 2) Pride, 3) Attachement and 4) Fun. Moreover, this study introduces emotions as an entrepreneurial compass to be utilized during the entrepreneurial process (Sarasvathy and Venkataraman, 2010), while exploring blue oceans. This is supported by previous research, which treats emotions as an important factor affecting how entrepreneurs evaluate business opportunities and determine choices (Foo, 2009). Moreover, Baron (2008) and Forgas (1995), cited in Foo (2009), highlight that in circumstances characterized by high uncertainty and high engagement feelings are utilized as cues on preferred courses of actions.

### **Soft Innovation- theories**

In order to align the concept of soft innovation with online music and the current research problem there is a chain of triggering events, which enable the concept of soft innovation to evolve. Previous research across Scandinavia in the early 2000s examined the music industry as an innovation system (Cunningham, 2011). Thus, the concept of soft innovation is aligned with current topic for two reasons. The first reason is the definition itself:

“Soft innovation is an innovation, which encompasses the artistic, emotional, intellectual and aesthetic” (Stoneman, 2010)



The definition well reflects the nature of music driven new venture being either a music driven digital service, application or a piece of music as all these embrace the artistic, emotional, intellectual and aesthetic. Thus, this study draws from Stoneman (2010), who deliver a systematic, economically, and policy-literate, evidence-based, account of creative industries and innovation (Cunningham, 2011). The second reason relates to the digital evolution as highlighted by Cunningham (2011) :

“ ... high growth aspects of the so-called “digital economy” tied to notions of first the internet and then web 2.0 as a platform technology “enabler” of innovative products and services” (Cunningham, 2011)

## METHODOLOGY AND DATA

This study adopts interpretive concept research (Lämsä and Takala, 2004) as a research method while conducting a literature review, which provides natural data, which exists independent of the researcher. Moreover, this study adopts elements from empirical observation based interpretive concept research (Lämsä and Takala, 2004) while drawing from researchers own 15 years of professional experience in the music industry. These longitudinal insights are by nature researcher dependent. Through these methods this study develops a dynamic framework, which sensitively reflects the nature of firm performance in online music (See Figure 02. p. 8). The data collection to support this methodology occurred through a key word search of the literature using Aalto library portal and google search. Keywords such as emotional capital, entrepreneurial orientation, soft innovation, firm performance and online music were utilized to explore scientific articles, books and online articles. The conceptualization of what lies beneath the firm performance in online music involved many hundreds of hours reading, synthesizing the essence and refinement of the framework via discussions with colleagues and professors over a period of 24 months.

As to the nature of reality, axiological assumptions and epistemological assumptions this study draws from Hudson and Ozanne (1988), cited in Shankar and Patterson (2001), who observe that following characteristics are often present in interpretive approach: 1) nature of reality is regarded as socially constructed, multiple, holistic and contextual, 2) axiological assumptions highlight understanding and 3) epistemological assumptions highlight idiographic, time-bound and context-dependent knowledge and view causality as multiple and simultaneous shaping and research relationship as interactive (Hudson and Ozanne, 1988).

## FINDINGS

"Micromultinationals -are the key to European prosperity. Hopes for recovery rest with SMEs, which can harness the internet and other new platforms to enter the global markets with a minimum of bureaucracy and overheads". - Lisbon Council think tank (2011)

Online music makes a fit and challenging research arena for addressing Yitshaki-Hagai and Rothstein (2010) call for drawing more attention to the interplay between entrepreneurs, affects and their ability to lead and the impact of this interplay on the venture's chances of success. In order to succeed firms may have to reflect the paradigm shift of the music industry, where the artist markets and sells directly to the fan (Music 3.0).

### Music 3.0 under development

The diversity of actors in the digital music driven business explodes as the lines in between are blurred as the roles change. In today's digital space music driven soft innovation may refer to platforms, which act as distributors, aggregators and channels. Whereas those platforms, which foster music creation and offer free music creation tools for artists, may also take over some of the functions that belonged to the record labels in the past such as distribution and even marketing. Also the role of the audience is changing as they share artistic content from their favourite artists to their peers, they also act as a marketing force in the new music industry, and thus adopt a role, which belonged to the managers, record labels and music publishers in the past. In the following Figure 01, Music 3.0 phenomena is visualized through creative processes, community/audience and soft innovation/the context.



**Figure 01. Music 3.0.** Inspired by The integration vision of the Music 3.0 concept, developed by The Music Tech. Group (MTG) of the Universitat Pompeu Fabra of Barcelona. Source: Helen Thorington (2008): "Music 3.0 under development"

Creative processes can be regarded as entrepreneurial processes or artistic performances, either solo performances or co-creative performances. Virtual community refers to the audience, which has a crucial role in music 3.0, where artists sell directly to the fan. In parallel Kozinet (2000), this study

proposes that virtual communities have a real existence for their participants, and thus have consequential effects on consumer behavior. Soft innovation refers to the context, either the digital product (piece of music, music related product etc.) or the digital space.

### **Antecedents of firm performance in online music**

This study indicates that the interplay between organizational capabilities such as emotional capabilities and firm-level strategic orientation such as entrepreneurial orientation (EO) affect firm's path to success in online music. As illustrated in the dynamic EC-EO-EP framework (Figure 02.), the interplay in between emotional capabilities, EO at the level of risk taking, innovativeness and proactiveness and firm-level performance is a dynamic interactive process. However, since the entrepreneur, the audience and the context in a specific moment are all diverse depending on the case and time in question, each combination of variables and their interrelations is a unique turnout.



**Figure 02. Dynamic EC-EO-EP framework.** Inspired by Helen Thorington (2008): “Music 3.0 under development” and Parkman et.al 2012

This dynamic interactive process can be regarded as answering the question of how new ventures are undertaken (Fayolle et. al, 2011). Thus, the entrepreneur is highlighted as the key actor, whose capabilities in risk taking, innovativeness and proactiveness (EO) and in producing and manipulating a variety of emotions and feelings (Zahra and Bettinelli, 2010) are considered as affecting firm performance. Thus, this study indicates that when this cycle emerges in music driven new venture creation for the first time, emotional capabilities, defined as :

emotional competencies which constitute a resource inherent organizational development and take part in social cohesion to social and economic success (Gendron, 2004, 2006)

form the starting point. After the starting point has emerged, the antecedents of successful entrepreneurship in other words EO at the level of innovativeness, risk taking and proactiveness may step in and serve as energizing strategic tools to further navigate entrepreneurship toward a growth path in online music. However, if there is a lack of emotional

capabilities, these antecedents may not work so beneficially, since emotional capabilities shed light on every stage in entrepreneurial process and thus enhance the potential causal power of innovativeness, risk taking and proactiveness. Thus, emotional capital then emerges as a result of the interplay in between the firm, the entrepreneur and the audience/community, which spreads the goodwill toward the firm or/and its digital products fast and easy through social media. Thus, this study indicates that there is a relationship in between emotional capabilities and emotional capital. However, it is difficult to coin which occurs first and whether there is a cause and effect involved. It is proposed that emotional capabilities may act like a causal power, which in nurturing environment may be transformed into emotional capital, which in turn may be transformed into firm success. However, this is the case only if website features and functions appeal the client in terms of information, service quality, ease of use, pleasure and design quality (Liu and Arnett, 2000).

### **Innovativeness, proactiveness and risk-taking in online music**

This study proposes that emotional capabilities affect firm-level innovativeness, proactiveness and risk-taking in the sense that entrepreneur with high level of emotional capabilities can more successfully extract benefits from these dimensions. This study indicates, that innovativeness is the most important EO dimension in digital music. Since innovation acts as a creative source, which drives the increase of cutting edge music driven digital initiatives. Innovativeness is also of essence when creating new things from nothing in the spirit of bricolage (Strauss, 1962) , whether it be a piece of new music or a digital application the audience has not seen before.

Proactiveness does not capture emotional nature directly through its textual definition, but if it is treated as something that opens up new horizons and enhances opportunity recognition, positive emotions signaling that things are going well may encourage entrepreneurs to try novel things (Fredrickson, 2001, Foo, 2009). Proactiveness in extracting benefits from social media tools in music is important to attract website visitors and turn them into buying clients, who in turn spread the word to their peers. However, in this regard it is important to notice that the power of the crowd has a strong effect on client behavior especially in online music. As the client's social nature highlight the innate need to be part of the crowd, especially young generations are keen to follow each other in music. Thus, the taste of music or success of soft innovations may be revealed rather through the digital practices of the group than the individual.

Risk taking dimension fits well with the music context (Kaya et. al, 2010) :

the essence of making music is taking risks to explore novel, creative paths, inventing responses without a prescribed plank (Pendergast, 2004).

In parallel, risk-taking may also be embedded in the entrepreneurial process as the start up explores novel, creative paths and invents new products and soft innovation without a prescribed plank. Risk taking may also have the closest link with negative emotions in the sense, that some risk-averse entrepreneurs may neglect risky business opportunities just to maintain on the safe and solid ground and thus avoid negative emotions. Moreover, in certain fields risk-averse entrepreneurs may even succeed better than the ones who embrace risk. For example in high tech ventures sometimes the better performance is due to minimizing risks and actually reflecting a relatively low EO (Hashimoto, 2011). Since positive emotional state of passion has been identified to foster entrepreneurial creative activities even in uncertain risky environments (Baron, 2008, Laaksonen et. al 2011), this study indicates that emotional capital in the risky and competitive online music drives entrepreneurs to perform well in opportunity recognition, venture creation and venture growth (Cardon et. al 2009).

## CONCLUSIONS

It is of great business interest to study how to extract new value from soft innovations in online music. As Berger, CEO of Sony (2011), points out:

"The rollout of legal services to new markets, the continued expansion of subscription services and the revolution in portability have all contributed to the accelerated growth of the digital music market."

The purpose of this study is threefold. First, this study performs a literature review on carefully selected blend of antecedents of entrepreneurial performance. Second, this study demonstrates the relationships between emotional capabilities, entrepreneurial orientation and firm-level performance and illustrates how enterprises can build their emotional capital in online music. Third, this study joins call for more attention to entrepreneurs' affect and ability to lead and the impact of this relationship on the venture's chances of success (Yitshaki and Rothstein, 2010) and introduces the concept of emotional capital to the field of entrepreneurship. As to research design interpretive concept research (Lämsä and Takala, 2004) is utilized to develop a framework, which sensitively reflects the essential nature of entrepreneurial performance and the human and creative nature of entrepreneurial process in the context of music. The originality of this study stems from utilizing author's empirical longitudinal

insights in co-creative processes in the music industry as a complementing epistemological tool in developing this framework. As to contribution this study aligns the concept of emotional capital (Huy and Shipilow, 2012) with EO theories to explore the research question: what lies beneath successful entrepreneurial performance in the context of online music. The study then remixes a framework inspired by Parkman et. al (2011) to capture how emotional capital emerges from emotional capabilities – EO – firm performance relationship. As to conclusion, in parallel with Huy and Shipilow (2012), this study highlights that firm success in online music happens only after the emotional capital toward a company and the way it operates has been built. The core value rises from extending EO to fit the nature of today's digital space and identifying those additional complementary concepts that boost firm performance in online music. Thus, the value of this study lies in introducing a carefully selected fit blend of theoretical elements in order to shed light on successful firm performance in digital music. Moreover, this study introduces emotional capital to the field of entrepreneurship, and complements the conceptualization of entrepreneurial orientation at the level of risk-taking, innovativeness and proactiveness to consider emotional capabilities as a central component of firm-level performance and survival in the fast and continuously changing context of online music. Although, there are issues that are to be elaborated in future research. This study could be extended further in the future to extract empirical fruits while testing the current framework after performing a case study .

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# Role of stakeholders in artifact and business design of small enterprises

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## Abstract

*The purpose of the case study is to examine innovative business design in the context of artifact production that is based on the co-design process of a company and its stakeholders, mainly customers and funders. The study focuses on activities companies do to obtain funding and elicit customers from the artifact and the business design perspectives. Effectuation theory sets the theoretical framework within which co-creation activities are analyzed. The aim is to map the co-creation activities done by companies and their stakeholders with people's creativity levels and product personalization options presented as theoretical design approaches. The research question is divided into two parts: first, what are the main implications of the two funding modes, crowdfunding and investor funding, from the perspective of co-creation and business design? Second, if co-creation activities between stakeholders and companies are embedded in companies' business design, how do they impact the design process of a company? The study consists mainly of the theoretical framework and approaches, and describes the set-up of the companies' businesses.*

*Key words: artifact design, innovation, crowdfunding, co-design, design management*

## 1. INTRODUCTION

Stakeholder network is a key enabler for a company to be successful. Small enterprises need funding for starting and expanding their businesses and customers for a steady money flow and prosperity. To gain a better position in the markets, small enterprises need to know their strengths, have a wide network of stakeholders, and play an active part in the network. Purpose of this study is to describe activities related to the co-design processes that the small enterprises have with their key stakeholders, customers and funders. The study views the co-design processes and two different ways of funding, conventional way through investors and a new way through crowdfunding via the lenses of effectuation theory. Our research question is divided into two parts: first, what are the main implications of the two funding modes from the perspective of co-creation and business design? Second, if co-creation activities with stakeholders and



companies are embedded in companies' business design, how do they impact the design process of a company?

It has been said that an effective use of design can be an enabler and source of competitive advantage in today's global markets (e.g. Borja de Mozota, 2003). An open innovation principle of Chesborough (2003) "Not all the smart people work for us" has become a relevant point for companies in today's global and competitive markets. Small enterprises face the pain more often than big ones because there all the functions and tasks are handled by a fewer people. Beyond the traditional definitions of design, the core principles and practices behind great design can be used in more general problem-solving, and reframing of the business opportunities (Fraser, 2006). Bruce Nusbaum raised up the importance of participation in Wired magazine in 2013 by stating that innovation happens in teams that have a deep domain knowledge spiced up with atmosphere of trust and familiarity. He also pointed out that the teams need professional "wanderers" such as coaches, venture capitalists and curators who bring in new ideas.

This study describes co-creation activities of two small enterprises, Primesmith and Linna Bike Shop, and their key stakeholders, and how the fingerprints of the stakeholders reflect in the design processes and business design of the companies. The purpose of this study is to examine innovative business design in the context of artifact production that is based on the co-creation activities between the company and its stakeholders, customers and funders.

### **1.1. Primesmith**

Primesmith sells jewelry in web, and the company is about to launch a web application that allows customers to design own pieces of jewelry with a web based 3D tool. Primesmith's aim is to offer a convenient, trustworthy and attractive way for the customers to buy jewelry. The web application is the first of a kind, and the company negotiates with investors and funding agencies to get funding for fine-tuning and further development of it. An initial version of the application was already launched but the company pulled it back due to usability issues that needed to be fixed.

Primesmith has a well-established and wide network of stakeholders, and the company has an active role in local community and in the national jewelry arena from design, manufacturing and education provider perspectives. Web application for creation of personal jewelry will be launched in fall 2013 after piloting with a beta version, feedback collection, usability test and fine tuning of the alpha version.

## ***Investor funding***

Primesmith seeks funding from investors, both funding agencies and business angels. The investors look for reliable business cases with distinct business plans. Business angels' expected payback time vary from case to case and the relationship between them and a company is closer than with funding agencies. Nevertheless, the investors take a helicopter view at the activities and networks of companies, and seek for return on investment.

### **1.2. Linna Bike Shop**

Linna Bike Shop was founded in 2011, and it applies the philosophy of living labs; openness, working together, experimentation and frugal innovation are fundamental principles of the company. The company promotes cycling and sustainability, it collaborates with local communities, is an active member in virtual communities, and perceives creativity, art, culture and frugal innovation as competitive sources for the success of the company (Takala, 2012). Linna Bike Shop sells and repair bicycles as well as is a café shop offering various types of coffee, other beverages and home baked cakes. The company plans to seek funding for a Tinga tinga project through crowdfunding via a Finnish crowdfunding platform

The company has a wide network of local people in Southern Finland and virtual people in social media. Linna Bike Shop is an active player in local events organized by private and public sectors, and the company offers internships and jobs for young people. The plan is to add Tinga tinga project into crowdfunding platform called Mesenaatti. Tinga tinga is originally an art form from Tanzania, and the company follows the definitions and ways of working of Tinga tinga art. Linna Bike Shop and Tanzanian Tinga tinga artists create the overall design framework for the co-creation activities. The company has already a wide network of people which will play an important role in the crowdfunding project.



**Figure 1. Tinga tinga art will be a colorful project in Mesenaatti, the Finnish crowdfunding platform.**

## ***Crowdfunding***

Crowdfunding is a collective effort of people and organizations to get funding for their projects and businesses (Buysere, 2012). Financing takes place via or with the help of Internet as small contributions done by a large number of individuals. Based on the service introductions in crowdfunding platforms such as Kickstarter, Indiegogo and Mesenaatti, funders respond to passion, sincerity, and an ability to execute. Crowdfunding is based on the fact that people want to help other people and projects they like and are emotionally or geographically attached to (Buysere, 2012).

## **2. THEORETICAL BACKGROUND**

### **2.1. Stakeholder theory**

Stakeholder theory tackles with a question of which groups are stakeholders that deserve or require management attention and which are not (Mitchell et al., 1997). There are several definitions to stakeholders which can be e.g. persons, groups or organizations. Stakeholder theorists take a broad or a narrow view of a company's ecosystem. The classical and broad definition as "any group or individual who can affect or is affected by the achievement of the organization's objectives" was made by Edward Freeman (1984). Narrow views are based on the reality of limited resources, time and attention in companies as well as managers' ability to deal with external constraints (Mitchell et al., 1997). Broad view takes into account the empirical fact that companies can affect or be affected by almost anyone (ibid.). Frooman (1999) approached the stakeholder theory from another angle; he studied the relationships between a company and its stakeholders whereas the original focus was on individuals, on dyads or triads. In the design process context, stakeholders play a major role in shaping the design and resulting product (Rajabalinejad, 2012). Awareness of the potential impact of stakeholders and understanding of their needs and expectations can provide insights that would otherwise not be recognized by a company.

### **2.2. Effectuation theory**

Sarasvathy (2001b) introduced the foundations of effectuation. Effectuation is a thinking framework that supports entrepreneurs when they start a business. The way of thinking provides an opportunity to co-creation by an entrepreneur and stakeholders. The effectuation cycle starts with means: Who am I? What I know? Whom I know? By knowing the means, an entrepreneur can think of possibilities that originate from them. The goal setting is done by stating a question: What can I do? The principle

called affordable loss is used when setting the goal: risks can be limited by understanding what an entrepreneur can afford to lose at each step. In the next phase of the cycle an entrepreneur interacts with other people and gathers commitments from stakeholders. The co-creation activities between an entrepreneur and stakeholders can develop the original idea in such a way that a whole network of stakeholders can commit to it. Effectual thinking is primarily means-driven and entrepreneurs see to generate new effects to be created and to select new goals between them (Sarasvathy et al., 2005)

Expert entrepreneurs can interpret surprises and changes as potential clues to create new markets whereas “non-entrepreneurs” perceive changes as problems (Sarasvathy, 2001a). Expert entrepreneurs can also build partnerships and co-creation strategies with appropriate stakeholders that they work with directly, and that way reduced the uncertainty of the markets (Read, 2008). Entrepreneurs focus on activities within their control and that way the outcomes of the actions are desired ones. Expert entrepreneurs think that the future is made, not found or predicted (Sarasvathy et al., 2001b). However, great design of products and services requires risk-taking and trying of new things, and there is a strong possibility of failure in the background (Fraser, 2006). Business design creates holistic solutions that bring value to the company and its customers by combining the customer needs with the strategy and resources of the company. Companies need to be creative and at the same time avoid risk-taking. There needs to be a balance between steady money flow i.e. exploitation and innovation of new designs, i.e. exploration (Martin, 2009).

### **2.3. Design approach**

In this article, co-creation refers to collective acts of creativity by two or more people (Sanders et al., 2008), and the intent is create something that is not known in advance. Co-design is an umbrella term for the process that includes many co-creation activities (Mattelmäki and Visser, 2011). It is about openness, collaboration and partnership. Alastair Fuad-Luke describes co-design approach as designing together with equal proportions of design thinking and practice to harness collective intelligence and improve economic and socio-cultural equity at the same time as strengthening societies’ enterprises and institutions and regenerating the environment ([www.fuad-luke.com](http://www.fuad-luke.com)). Co-design refers to collective creativity as it is applied across the whole span of a design processes (Sanders et al, 2009).

Participatory design (PD) originates from Scandinavian way of life in the 1970's. It has its roots in research of democracy forms with a focus on people participating in the design process as co-designers. The rational is to involve users in the design already in the designing phase of an artifact (Redström, 2006 and 2008). Thanks to the evolution of design research from user-centered approach to co-designing, the roles of people involved in the processes are evolving as well as the concept of creativity (Sanders and Stappers, 2008). People's abilities can be categorized in a creativity model with four levels based on an argument that all people are creative but not all of them become designers (ibid).

- ❖ Doing, people are motivated by inspiration to “express own creativity”
- ❖ Adapting, people are motivated by asserting own ability or skill to “make things with own hands”
- ❖ Making, people are motivated by appropriation to “make things my own way”
- ❖ Creating, people are motivated by productivity to “get something done”

The model gives a tool for companies to map and confirm that the different ways to support people's abilities to participate in co-creation activities, and preferred ways for people to be creative are embedded in their service and product portfolio.

Research on toolkits for user innovation and design has recognized certain patterns when customers are allowed to customized products that suit their individual preferences; preferences are heterogeneous and customers are willing to pay more of the product if they can design it according to own individual preferences (e.g. Franke and Piller., 2004). Meaning of value and the processes that create value (e.g. Prahalad and Ramaswamy, 2004; Sanders and Stappers, 2008; Iversen et al., 2012) are closely linked with co-creation activities. However, the focus of the study is on the perspective of and means of companies, so the value aspect is recognized in this study but we do not concentrate on it. Another research angle relevant to PD is the lead-user one (von Hippel, 2005; Seybold, 2006). Nevertheless, PD has an agenda for social justice (Greenbaum and Loi, 2012), so the study concentrates on co-design process of people with own preferences.

Mugge et al. (2009) studied the roles of consumers and designers from the perspective of product personalization. Personalization refers to a combination of designers' creativity and the creativity of people who are not trained in design of the product development process (Sanders and Stappers, 2008). Personalization means that designers involve consumers

in the design process by creating them possibilities to play an active role in the process and create products based on own desires and needs (Mugge et al, 2009). The personalization options can be divided into seven categories which could turn out to create competitive advantages for companies (ibid.):

- ❖ Mental effort, consumers' degree for creative involvement
- ❖ Physical effort, consumers' degree for physical involvement
- ❖ Flexibility, degree to which personalization is flexible
- ❖ Initiation, degree to which designer initiates the personalization process
- ❖ Goal of product personalization, degree to which utility-related and/or appearance-related goals are fulfilled
- ❖ Personalization moment, time window when the personalization takes place (before purchase, before usage, during usage)
- ❖ Deliberateness, degree to which personalization is done deliberately

The model presents a way to review and characterize how the nature of the co-creation activities and the made artifacts.

### **3. METHODOLOGY AND DATA**

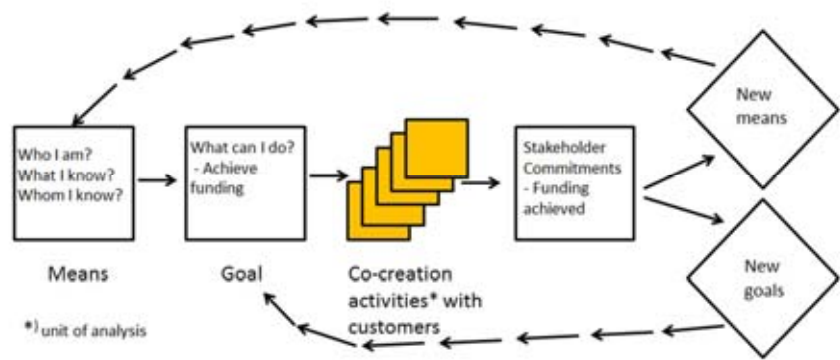
This is an explorative case study (Patton, 2002) where we aim to understand co-design processes of the companies in the light of effectuation theory by mapping and analyzing the co-creation activities of the companies within their stakeholder network. Data is collected through observations and gathering information in e.g. company web pages and by doing interviews with semi-structured questions (Appendix 1). Within case and cross case analysis of the data will be done with Sanders and Stappers (2008) and Mugge et al.'s (2009) theoretical models.

The cases of the study are information-rich in own special ways so purposeful sampling (Yin, 2003) was a natural way of choosing the cases. Unit of analysis of the research is a co-creation activity between the companies and their stakeholders.

### **4. FINDINGS**

The studied projects were put into a framework of effectuation theory (Figure 2). The means of the companies are in the knowledge, skills and expertise of the personnel and their stakeholder networks. Companies set

goals by answering to a question what can I do. The goal for both of the studied projects is achieve funding although the means and ways of achieving the goal are different. Primestmith’s co-creation activities are done by customers within the web application created by designers and developers of the company. Linna Bike Shop’s co-creation activities are done by Tinga tinga artists, customers and people participating in the crowdfunding project of the company. In the end of the day, goal is reached by getting strong commitment from stakeholders. By achieving the goal, companies can develop not only the project the research is focused on but also other areas thanks to increased liquidity of the company.



**Figure 2. Theoretical framework of the case study.**

The first phase in the data analysis will be to use the categories of creativity presented by Sanders and Stappers (2008), and map the characteristics of the web application and Tinga tinga project accordingly. Data gathering is still on-going, so the mapping will be done in the near future. The next phase in the analysis will be to use the personalization options presented by Mugge et al. (2009), and map the findings accordingly.

### 5. DISCUSSION AND CONCLUSIONS

The studied projects are still in the early phase of development so this study concentrates more on the theoretical framework and paints the overall picture of the phenomena at hand. However, already at this stage it is clear that the approach and research angle will sheer new light to the co-design area from small company perspective.

It will be interesting to follow the development of the enterprises and later on, what the impact of the projects will be like. If the companies started a new funding campaign, how useful would be the lessons learned from the first round? There are many ways to combine funding approaches

depending on a project, product, and service, so it will also be interesting to see how the markets evolve in five or ten years.

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## Appendix 1

1. How would you describe the company?
2. What are company's areas of expertise?
3. How would you describe different networks of the company?
4. How would you describe the customers?
5. How would you describe company's role within the network?
6. How would you describe company's role in the local community?
7. How does the company collect feedback from the stakeholders?
8. In what kind of local or national or global events does the company have a role? What kind of a role?
9. How does the company collaborate with its networks?
10. Who belongs to company's networks?
11. How are new people "added" to or "removed" from company's network?
12. How does the company communicate with various networks?
13. How is the dynamics in the networks?
14. What does the company give to the networks?
15. What does the company get from the networks?
16. How is the trust in the networks?
17. Could you describe the current web application/crowdfunding project?
18. What is company's role in the project?
19. What is the time horizon in the project?
20. How does the company perceive collaboration with customers?
21. How would you describe company's collaboration with the investors?
22. How are the investors involved in company's work?
23. How do these apply to the project (Sanders & Stappers):
  - I. Doing, people are motivated by inspiration to "express own creativity"
  - II. Adapting, people are motivated by asserting own ability or skill to "make things with own hands"
  - III. Making, people are motivated by appropriation to "make things my own way"
  - IV. Creating, people are motivated by productivity to "get something done"
24. How do these apply to the project (Mugge et al.):
  - i. Mental effort, consumers' degree for creative involvement
  - ii. Physical effort, consumers' degree for physical involvement
  - iii. Flexibility, degree to which personalization is flexible
  - iv. Initiation, degree to which designer initiates the personalization process
  - v. Goal of product personalization, degree to which utility-related and/or appearance-related goals are fulfilled
  - vi. Personalization moment, time window when the personalization takes place (before purchase, before usage, during usage)
  - vii. Deliberateness, degree to which personalization is done deliberately

# Roles and Identification of Stakeholders in Health Care IS Development

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## ABSTRACT

*In this paper, we ponder the practical consequences of the unbalanced power structures and difficulties in determining the appropriate stakeholders in IS development. Empirical data from two usability studies in health care are represented. In the first case we describe how legislator-centered IS development resulted in unfit between the renewed IS and clinical work. In the second case we observed that the role of physician as an entrepreneur and the role of nurse as an informant are of equal value as their role as care workers when designing UI for clinical work. We conclude that undiscovered and unpowered (roles of) stakeholders in IS development projects are one reason for poor clinical usability of health care information systems.*

## KEYWORDS

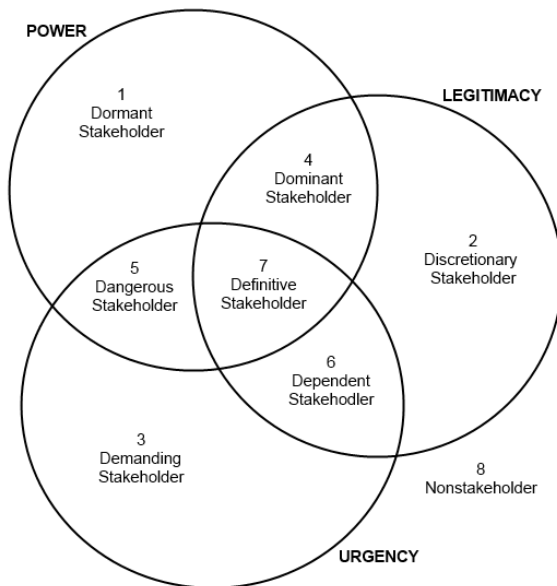
*IS development, Stakeholder, Participation, Usability, Health care*

## PARTICIPATION, ACTORS AND STAKEHOLDERS

At present, some form of user participation is common in information system (IS) development (Bødker, 2006) and it is a general belief that user participation as such has some kind of positive effect on the outcome of a development project (Spinuzzi, 2002, Kyng, 2010). The forms of participation differ, however, largely. For example, users can be considered as equal partners and co-creators as in the Scandinavian participative approach (Bødker & Iversen, 2002) or as informants who are allowed to react to the solutions created by the designer (Bodker, 2009).

Users, designers, and managers are typically the involved actors of a participatory IS development project (Pouloudi, 1999). In many cases there are, however, even other parties that can affect or are affected by the decisions made in an IS development project and these parties are not

always easy to recognize (Kaplan et al. 2009). Stakeholder analysis offers one way to identify the prominent parties and explore their role and salience in a development project (Pouloudi & Whitley, 1997, Boonstra & Govers, 2009). The concept of stakeholder has been defined and used in many different ways both in the field of strategic management (Mitchell et al., 1997) and that of information systems (Pouloudi, 1999). We use a modified version of Freeman's (1984, p. 46) widely accepted definition of a stakeholder: 'A stakeholder is any group or individual who can affect or is affected by the developed information system' (see Boonstra & Govers, 2009). In identification and classification of stakeholders we adopt the typology presented by Mitchell et al. (1997) (Fig. 1) and applied in the information systems field, for example, by Boonstra & Govers (2009).



**Figure 1. Stakeholder typology (Original figure by Mitchell et al., 1997, 874)**

According to the stakeholder typology (Mitchell et al., 1997, 854), "stakeholders can be identified by their possession or attributed possession of one, two, or all three of the following attributes:" power, legitimacy, and urgency (see Fig. 1). Power means the ability of those who possess power to bring about the outcomes they desire, legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions. Urgency is the degree to which stakeholder claims call for immediate attention and it is based on two attributes, time sensitivity and criticality. Stakeholder salience (importance) depends on the number of attributes the stakeholder has. Stakeholders in the low salience classes (1, 2, and 3 in Fig. 1) are called latent stakeholders. Expectant

stakeholders have moderate salience (4, 5, and 6 in Fig. 1), and definitive stakeholders are highly salient (7 in Fig. 1).

We have applied the stakeholder typology in two case studies in the health care sector in Finland in order to bring forth the stakeholders, their mutual power structures, and actual participation in the IS development projects. The aim of both attended IS development projects was to design new versions of existing health care applications. The application of the first case study was a realization of an EPR system that would fulfill the requirements of the new nationwide eArchive system. In the second case, the studied application was aimed to renew the physicians' and nurses' desktop of an occupational health service provider. In the health care sector the number of stakeholders can be rather large, stakeholders may have conflicting interests and the authority of some stakeholders is based on the legislation. In this kind of environment it can be difficult to decide who the stakeholders are and who should participate in the role of an actor.

In the next two chapters we introduce the results from the two case studies and describe the practical consequences that the selection of stakeholders and the unequal power relations between the stakeholders had on the usability of the systems. In the last chapter, we discuss how the stakeholder analysis can be applied to bring forth those parties that should be actors in a development project and how usability testing can be applied in gathering information also from outside the original design specifications.

## CASE ONE: LEGISLATOR-CENTERED DEVELOPMENT

### **Background and stakeholders of the KanTa project**

In Finland, public healthcare is arranged by municipalities or federations of municipalities and electronic patient record (EPR) systems have been utilized in all areas for at least 10 years. Typically each municipality has acquired and manages its own EPR system and the systems do not communicate with each other over the borders of the municipalities even though two software vendors have about 90% market share of the public healthcare EPR systems and nearly 100% market share of the central hospital EPR systems (Forsström et al., 2012).

During the first years of the new century the development of some kind of nationwide EPR system or a system with a summary of key medical information was started in several countries (Greenhalgh et al., 2013). The Finnish Government decided in 2002 that a nationwide electronic patient record will be implemented by the end of 2007. The solution chosen by

Ministry of Social Affairs and Health (STM) was a centralized nationwide health information management system that would include electronic prescription center, electronic patient information archive and electronic patient record (STM, 2007). Legislation concerning the nationwide EPR and its implementation schedule has been renewed several times during the years and in early 2013 the electronic prescription has been implemented and the EPR archive system must be used nationwide latest in September, 1, 2014. The legislation states that the use of the services is mandatory to all public healthcare units and to those private healthcare units that do not use paper archiving (STM, 2006; STM, 2007; Virtanen, 2013).

In 2013, the undertaking is called The National Archive of Health Information (KanTa) and it includes the following services: Electronic Prescription, Pharmaceutical Database, My Health Information, and Patient Records Archive (KanTa, 2013). The designed archive system for patient records is a centralized data storage that is used via local EPR systems, i.e. the data created in one local EPR system is stored into the archive and can be later retrieved into the same or another EPR system. Since the beginning of the project, the definition of the centralized data base and the functional requirements has been under way.

The definition work is led and carried out by the national health institutions. According to the 2011 legislation (see KanTa, 2013) there are five main actors with defined responsibilities: Ministry of Social Affairs and Health (STM), National Institute for Health and Welfare (THL), Social Insurance Institution of Finland (Kela), The Population Register Centre (VRK), and National Supervisory Authority for Welfare and Health (Valvira). All of these actors can be classified as definitive stakeholders (see Figure 1) having high salience as they possess power, legitimacy, and urgency, i.e. whatever their claims are and whoever they may concern, the claims must be taken into account. The KanTa presentation page (KanTa, 2013) names also few other stakeholders that are called partners, for example, private and public healthcare and pharmacies, data system and data network suppliers, and Finnish Medical Association (Lääkäriliitto). They get their legitimacy from the definitive stakeholders but according to our interpretation they possess rather little power or urgency to drive their claims, i.e. they are latent, discretionary stakeholders (see Figure 1).

It is worth to note that the vendors of the local EPR systems and all the user groups using these systems, i.e. healthcare professionals, are deliberately left out from the list of stakeholders. Neither has citizen, whose information is archived and who is allowed to control his information and consents, been named as a stakeholder. In other words, the KanTa project produces

the archiving services and defines data structures and the functional requirements of the connected EPR systems, but it does not take a stance on how the data should be created by the health care professionals in their work processes, how the user requirements should be implemented in the local EPR systems, or how the citizens should exploit the viewing of personal health data. In order to implement the functions, the software vendors of the local EPR systems must carefully follow the changing legislation and the steadily developing requirements and try to develop their systems accordingly. A lot of this work is technical in nature but also changes in the user interface are, of course, inevitable. During the development, user participation is solely dependent on the practices of the software vendor. Changes in the user interface, terminology, and ways of recording medical records have in turn a direct effect on the work practices of the end-users.

### **Gathering of empirical data**

The first pilot test of the patient records archive system was carried out 15.11.2011-23.2.2012 in one municipality. There were about 100 users from different roles like physicians, nurses, secretaries, and typists. Technically the pilot was a success but the use of the system did not, however, proceed smoothly and the users gave rather harsh feedback for the system. As a conclusion it was noted that the new structured way of storing medical records demands changes in work practices and in order to execute the change, information systems usability must be improved, personnel must be thoroughly trained, and user support must be adequate.

In order to get explicit information about the experienced problems and their causes, a usability evaluation of the piloted system was carried out two months after the piloting period. In the evaluation, six users were asked to carry out their typical work tasks using the application and in the same time comment and evaluate the application (think aloud method).

### **Changes and problems in work practices**

The changes that had most effect on users' work practices were 1) logging in into the system with a smart card, 2) structural and terminological changes in medical records, 3) introduction of new concepts like service event and phases of care, and 4) collection of new statistics. The use of a smart card in logging in into the system is a security issue defined in the KanTa specifications. This change did not raise resistance but was taken as an improvement.



The definition of the structure of the medical records has been one of the main efforts of the KanTa stakeholders and the existing specification is surely logically coherent and in accordance with the international standards. The defined structures and even the vocabulary used in them are, however, rather unfamiliar to the health care professionals who are supposed to use them in their work. In the earlier EPR system the content and order of presentation in medical records followed professional conventions (like GP's entry of an encounter with a patient) and locally decided practices. The new system forced the professionals to use the nationally decided standard vocabulary in the headings of the entries, which order was also predefined but adjustable on the organizational level. All the health care professionals from GPs to home care nurses experienced problems with creation of medical records throughout the pilot period.

The two new concepts, *service event* and *phase of care*, caused even more troubles to the health care professionals than the new headings. A service event is a high level concept that binds together all the patient data (markings in patient record, test results, etc.) that belong to the same context or "thing" (KanTa, 2012). The concept is meant to serve the citizen, not the health service provider, as "even though it would be reasonable and beneficial to define the service event so that also the service provider's needs would be taken into account, it is too difficult for the moment" (Kanta, 2012, pp. 5-6). All the user groups had difficulties in understanding how the concept of service event should actually be applied: when a new service event should begin or end; shall it begin when a citizen calls to make an appointment or when the citizen meets a healthcare professional, shall a service event end when the citizen leaves the health care professional after an appointment or not until the results of the laboratory test are ready and citizen has called the results. Furthermore, every document and even an act of accessing to the patient record must be connected to a service event. We observed that all the user groups need access to patient records before and after the "official" opening and closing of the service event. Every time a decision of whether to create a new or connect to an old service event was made and the rules were unclear to users. Therefore, during the pilot period the amount of created service events was surprisingly high, although in contrast, in home care unit the question was how many years a service event should last? While these service events were used also in UI to organize markings on patient records GPs confronted problems in finding these markings - even of their own or latest ones.

Other similar conceptual constructs, the phase of care as well as *the reason for accessing the patient record*, did not make sense to the users either.

Rather soon it was decided that all care activities are marked under one phase (realization of care) by default and as reasons for accessing patient record are so many it is insignificant what list option to select.

The implementation of the eArchive functionalities in the EPR system also incorporated the new statistical information gathering functionality, called Register of Primary Health Care Visits (in Finnish: avohoidon hoitoilmoitus; AvoHilmo). This strictly defined and classified information is gathered for statistical purposes and this information, “fills a gap in the national social and health data resources and gives considerably better possibilities to follow the functioning of public health care and clarify the health problems of the population” (Rautiainen & Saukkonen, 2012, 3). Even though information gathering is comprehensive it has been stated that “information consists mainly from the note of medical records created during an encounter” (ibid. p. 8). This sounds reasonable, but it is forgotten that all the data for the statistics must be input by the users of the EPR systems, either in conjunction with the note making or separately. Both the introduction of the eArchive and the collection of new statistics brought about changes in the interface of the EPR as well as in work practices, hence their respective effects on the rather harsh feedback from users is difficult to ascertain. From the practical point of view this is not a problem as both practices will be implemented permanently in the near future.

## CASE TWO: PROFESSION-CENTERED DEVELOPMENT

The aim of the development project was to renew a current EPR system used by private occupational health care providers in Finland. The EPR system covers the whole care process of the occupational health care from patient appointment to visit, invoicing and reporting. The renewal was rather fundamental, as both the technological foundation of the system and the software implementation tool would be changed. In the first phase of the development project the UI modernization was confined to functionalities on the physician’s and nurse’s desktop module. With the desktop module physicians and nurses manage their appointment calendar, view and add entries to patient records, input health measurements, order laboratory examinations and view results, write prescriptions and invoice customers etc. to carry out their daily tasks.

Project planning and subsequent development phases exploited initial drafts and existing knowledge about the EPR concept, its requirements, and the description of the context of use of each system module: management, care and reporting. The design team possesses a lot of experience in the

development of health care applications so the interface requirements set by the connected systems and the requirements of the legislators (here: definitive stakeholders, see group 7 in Fig. 1) were taken into account in the first place. Compared to Case 1, the legislation was easier to obey and well-known as the new KanTa-related legislation does not bind the private healthcare providers for another couple of years. The identified parties in the description of context of use were patients, physicians, nurses, secretaries, main users, customer companies of the care provider, insurance companies, and several national instances (STM, Kela etc.). From these parties physicians and nurses were nominated as participants to the UI development effort. According to our interpretation they were dependent stakeholders, i.e. they had urgent and legitimate claims that they expected to be fulfilled but they did not have power to carry out their will or collaborate in design in practice (see group 6 in Fig. 1). Customer companies of the care provider and the care provider itself were definitive stakeholders, but they did not express any claims as organizations. Patients, main users and other potential user groups were non-stakeholders (group 8 in Fig 1).

User needs and problems with the old system were collected in six interviews that were conducted by a third party who was responsible for designing the new concept and the user interface of the desktop application. Interviews were performed in three units of one occupational health care provider and involved physicians, nurses, secretary and representative of IT staff. Basing on these and other information the third party company designed the first wireframe of the desktop. A paper based version of this application was used in the usability test conducted by us in the premises of the care provider. Two nurses, four physicians and one application manager participated in the test during which a subject performed one patient visit with the paper prototype of the physician's/nurse's desktop.

### **Dual user roles**

Already in the document of the context of use an efficient reporting function for the use of different parties was identified as one of the critical success factors of the EPR system. Indeed, the importance of reporting in the occupational health care will increase in the future, for example, due to a societal need to lengthen work careers, which may also be fostered with legislative means. Therefore, the reporting function of the EPR system needs to support and provide statistics of preventive health care actions at individual and organizational level, in order to show the effectiveness of occupational health care. The current reporting facilities of the system serve

the health care provider and their customer companies that help them to fulfill their obligations to other stakeholders such as national authorities.

However, during the test sessions it was observed that the requirements of the customer companies are difficult and laborious to fulfill with the current way of reporting. In addition to daily clinical work nurses are also responsible of compiling statistics and reporting to customer companies. The roles of nurse as a care worker and as an informant are interrelated. By entering data in a structured form during the patient visit nurse can later answer to the practical question from a company like “how many employees in our company have high blood pressure?” While the concept design phase focused on renewing the desktop UI that is mainly used during patient visits, it unintentionally left out the role of informant that nurse takes between and after a patient visit or in the end of the day. The nurses claim the current reporting application to be old-fashioned and they have suggested improving reporting, not only because their competitor seems to have a better system for reporting, but also to make the health data easier to assembly and analyze for the use of customer companies. Currently, the reports need to be completed with analysis in Excel sheets, in order to maintain the desired quality of the health reports.

Similarly, the physicians can have a dual role in the private occupational health care. On the one hand, they keep practice and care patients from the customer companies contracted with the health care provider. On the other hand they are individual practitioners, i.e. entrepreneurs who work in the premises of the health care organization. Such twofold role became apparent during the test sessions, because the physicians were highly focused on the functionality related to invoicing and tracking of number and attributes of patient contacts. As entrepreneurs the physicians need to calculate revenues and returns for their personal purposes and also to fulfill their legislative obligations as entrepreneurs. The paper prototype of the desktop introduced an invoicing functionality for patients and customer companies, but rather it generated questions about how the new system could function also for physicians in the role of entrepreneurs. Physicians wished to see a daily summary about who has been invoiced and who is to be invoiced, receipts of those invoiced and possibilities to print and export these data into their own bookkeeping systems. Undoubtedly, usability of the physician’s desktop in the means of effectiveness and usefulness would be hindered without identifying their needs also as entrepreneurs.

The reporting needs of the stakeholders, including the needs of customer companies, were shortly described in the document of the context of use. However, the needs were not considered in the beginning of the redesigning

the UI, although the desktop defines the data to be gathered from the clinical care work that later forms a basis for successful reporting.

## CONCLUSIONS

The KanTa service was expected “to promote patient and client care and confidentiality and increase the efficiency of healthcare services... to cost 10 million €” (STM, 2006). Today, costs are approximated to be 208 m€ and annual benefits 184 m€ (Virtanen, 2013). Benefits, however, can be quickly misspent on fixing usability and other problems encountered in clinical work due to unequal possibilities of users to participate in the development. We observed that the new concepts defined by the definitive stakeholders had no grounds in clinical work of “non-stakeholders”. After several years of development and discussions of for example the concept of service event finally showed its ambiguity in practical test and much development must be made before its adoption. As the development is not to be cut down, clinical workers and citizens should be identified as important stakeholders already in the high-level project plans concerning the implementation of the KanTa and its new concepts. At least we assume that the result of the pilot period and the usability of service event would have improved by involving users in co-design and testing much earlier.

On the other hand, as shown in the second case, involving users on the center of the development may become biased too if requirements exploration is confined only to predefined roles of the participants and their work tasks. The observation about dual roles of nurses and doctors brings also the definition of stakeholder “as an individual or an organization” (see Freeman, 1984) into different light. In these IS development cases we would have benefit from more detailed description of stakeholders, which considers the role of stakeholder as the unit of analysis. A role-based stakeholder analysis together with stakeholder typology (see Mitchell, 1997) would be adequate tool to represent and understand even complex settings of IS development, such as the KanTa project introduces.

Understanding of positions of key players in the development was beneficial to us also when evaluating the usability of the systems. If applied in creative manner, usability tests can be used to bring forth even such user needs that have not been included into the tested design solution. In both usability studies we did not focus only to the context of the design or to the roles of users of the design, but tried to take a holistic view on subject’s work. In practice we applied open-ended test tasks that differ from conventional testing in that instead of suggesting what subjects’ should do

with the application they are asked to perform their work (the new design is available for support). In this way usability testing can give users more voice even if they have not been listened to earlier, in other words, to transform a user from an informant into an actor and towards being a definitive stakeholder.

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# Negotiating and crossing boundaries in and across school and museum settings

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## ABSTRACT

*Formal education and its practices have been criticized for being unable to exploit fully the cultural resources outside the school, and to recognize and harness the experiences that pupils bring to school from other contexts. This study approaches these challenges by addressing the potential of collegial and multi-professional collaboration of teachers and museum professionals to co-design expanded and integrated learning settings and contexts which support and enhance learning and participation of all pupils, as well as the learning potential emerging at boundaries and boundary crossing. The purpose of this ethnographic study is to examine how class teachers and museum professionals are negotiating and crossing boundaries whilst collaborating in and across school and museum settings.*

*The study draws on the theories of boundaries and boundary crossing, and on the socio-cultural theories of learning, development and collaboration. The multi-sited ethnography was applied by following and documenting with videocameras the collaborators' co-design and implementation practices at the primary school and at museums. The collaboration is approached by examining the boundary negotiating and crossing practices as social constructs emerging in an on-going interaction and talk during the planning meetings of collaborators, during the implementation and integration of study visits into school practices, and during the interviews of participants.*

*Based on the analyses of the video and audio recordings, this study will illuminate how boundaries, boundary negotiation and boundary crossing are brought to light in talk, interaction and actions of the participants. The study will also shed light on the ways in which boundary negotiation and crossing practices are intertwined with collaboration and co-design efforts of class teachers and representatives of museums.*



## KEYWORDS

*Boundary, boundary crossing, boundary negotiation, co-design, multi-sited ethnography*

## INTRODUCTION

While people are moving across different institutionalized practices, they are interacting across professions, disciplines, and cultures (see e.g. Akkerman & Bakker 2011b) and, at the same time, they are facing both opportunities and challenges for learning and for developing their practices and routines. However, in the field of educational research, many studies have focused on exploring learning and development only within some particular area of expertise or practice (Akkerman & Bakker 2011b) or within one institutionalized setting. In a similar way, research has been conducted at museums and, therefore, we have a limited understanding of collaboration efforts and learning transitions and trajectories of teachers and pupils, whilst they are moving and crossing the boundaries of these institutions. However, it is widely accepted that people are learning everywhere: at school, at the museums, at home, doing hobbies, and out in nature. Yet, experiences and learning in one setting are not always discussed and elaborated further, or even acknowledged and legitimized in another setting.

In fact, formal education and its practices have been criticized in many ways; for example, because they have been unable to exploit fully the cultural resources outside the school, and have failed to recognize and harness the experiences that pupils bring to school from other contexts (Hubbard, Mehan & Stein 2006; Resnick 1987; Sarason 1993; Tyack & Cuban 1997; Kumpulainen & Lipponen 2010; Kumpulainen & Lipponen 2012; Kumpulainen, Lipponen, Krokfors, Tissari, Hilppö & Kanninen 2009).

The present study approaches this criticism by addressing the potential of collegial and multi-professional collaboration of teachers and museum professionals to expand and integrate diverse learning settings and to bridge learning in and across different learning contexts. The collaboration calls for the creation of a common ground and a shared and mutual understanding of an object of activity. However, when working and collaborating across disciplines, 'professionals may face boundaries between different perspectives and practices' (Akkerman & Bakker 2011b). In this study, the boundaries are understood as 'socio-cultural differences

leading to discontinuity in action or interaction' (Akkerman and Bakker 2011b).

The purpose of this ethnographic study is to examine how class teachers and museum professionals are negotiating and crossing boundaries whilst collaborating co-designing and teaching in and across school and museum settings. In the present study, the collaboration and co-designing are approached by examining the boundary negotiating and crossing practices as social constructs as they are emerging in an on-going interaction and talk during the planning meetings of collaborators, during the implementation and integration of study visits into school practices, and during the interviews of participants.

## THEORETICAL BACKGROUND

### **Socio-cultural framework**

The study draws on the socio-cultural theories of learning, which see human activities socially and culturally mediated, and learning and thinking situated in a socio-cultural setting and, thus, dependent upon the utilization of social and cultural resources and artefacts (Vygotsky 1978; Wertsch 1991; Bruner 1996; Brown et al. 1989; Lave & Wenger 1991). In the wider framework of the socio-cultural tradition, learning is seen as a matter of participation in a social process of knowledge construction (Greeno 1997; Vygotsky 1978), "enculturation" (Brown, Collins & Duguid 1989), guided participation (Rogoff 1990), or legitimate peripheral participation (Lave & Wenger 1991). Knowledge emerges through the network of interactions and is distributed among those (humans and tools) interacting. (Tissari, Kumpulainen, Lipponen & Krokfors 2008.)

From the socio-cultural perspective, tools that people use in their activities have a central meaning in learning. People are very clever in creating different tools to support and extend their activities (Vygotsky 1978; Säljö 2001). These can be conceptual and discursive tools (e.g. concepts, models and theories), or material tools (e.g. instruments, machinery, measuring devices, information systems). (Tissari & al. 2008.)

Above all, various conceptual, discursive or material tools also serve and transmit participation and human interaction (Säljö 2001). Tools can also have a communicative meaning. Finally, cultural and historical information and skills are included among the tools of activity (Säljö 2001; Wenger 1999). The information 'cast' within the tools requires quiet information

that can only be acquired through participation in the activities of a particular community and by using their tools. (Tissari & al. 2008.)

### **Boundary, boundary negotiation and boundary crossing**

The notions of boundary, boundary crossing and boundary object are among the key concepts of my study. People may face boundaries 'between different perspectives and practices' when they are studying, working or collaborating across disciplines (Akkerman & Bakker 2011b). In this study, the boundaries are understood as 'socio-cultural differences leading to discontinuity in action or interaction' (Akkerman & Bakker 2011a, 6; 2011b, 1). Although socio-cultural differences can lead to discontinuities in action and interaction in various ways at various times, these discontinuities can also be overcome, even if temporal and partial. In fact, "it is by means of discontinuities that sociocultural differences between practices are defined and shaped". (Akkerman and Bakker 2011a, 152-153; 2011b.)

People, objects and interactions can cross boundaries (Akkerman and Bakker 2011b, 2). People who are crossing boundaries are often called boundary brokers or boundary crossers (Akkerman & Bakker, 2011b), whereas interactions established between these actors from different practices are called boundary interactions or boundary practices (Wenger 2000; Akkerman & Bakker 2011b). In a similar way, objects crossing boundaries are called boundary objects (Star 1989; Star & Griesemer 1989; Akkerman & Bakker 2011b).

A boundary object is an analytic concept of a scientific object which "both inhabits several intersecting social worlds" and satisfies "the informational requirements of each of them" (Star & Griesemer 1989, 392–393). The creation of a boundary object is one mean of satisfying potentially conflicting sets of concerns (Star & Griesemer 1989, 413) which might arise when people from multiple fields collaborate. The concept of boundary object is relevant to my PhD project, but it is discussed in another paper.

In the present study, the concept of boundary crossing provides a means 'of conceptualising the ways in which' new professional practices might be co-created in the collaboration between workers representing different professional backgrounds (Engeström, Engeström & Kärkkäinen 1995; Engeström, Engeström & Kerosuo 2003; Daniels 2008). However, previous studies have indicated that personal and locally encountered boundaries can also remain implicit during the negotiations. The verbal construction of boundaries may trigger, for example, dialogical engagement and invite other participants to explore and learn new perspectives. (Akkerman 2011, 5).

In the present study, I am examining how boundary negotiation and boundary crossing are brought to light in the talk and interaction of participants representing different learning settings. This helps us to understand the dynamic and situated nature of boundaries and boundary crossing, and the negotiation process of them. In fact, the study is focusing on boundary negotiation and boundary crossing as social constructs emerging in an on-going interaction and talk taking place in and across school and museum settings.

## METHODOLOGY AND DATA

### **Ethnographic research strategy**

I applied the ethnographic research strategy (Atkinson & Hammarsley 1994) and conducted a multi-sited ethnographic fieldwork by following the members of two classroom communities, that is, the class teachers (N=2) and the pupils (N=8+15) as they were engaged in their study projects at the primary school and during their study visits to museums and a nature school. I applied the multi-sited ethnography (Marcus 1995), since it provided a means to follow the collaborators as they were co-designing and implementing extended learning environments.

### **Data collection methods and the data**

The data were gathered by documenting the activities of two classroom communities by video-cameras and audio recorders at the primary school, at the museums and out in nature, and by interviewing the participants and collecting some artefacts. The participants of this study were class teachers and their assistants (N=4) and the pupils (N= 8+15) (1st graders and 3rd graders, from 7 to 10 years old), as well as professionals representing the museums. I observed and video recorded the lessons in the primary school for a period of about 1 year, and documented their study visits together with several other researchers of the research team. During the first five months in Spring, I was collecting data intensively every time when the teachers and the pupils were occupied with their “Forest” project. During the Autumn, I collected data in a more selective manner, focusing on instances in which the collaborators were planning for the study visits, and when the learning community visited museums, a nature school, and nature. The empirical data were recorded mainly by using video cameras, and in some cases with an audio recorder. The empirical data include the video and audio recordings from the planning meetings of collaborators, and the video recordings from the museum visits and from the natural science

lessons at the primary school before and after these visits. In addition, the data include the interviews of the participants, and some artefacts.

### Data analysis methods

Akkerman and Bakker (2011a) have argued that, methodologically, researchers need to take not only a systemic or macro perspective, describing the socio-cultural differences (e.g., cross-contextual analysis), but also need a situated or micro perspective describing, for example, who experiences a particular discontinuity in which interactions or actions. In this way, it becomes possible to study how socio-cultural differences play out in, and are being shaped by, knowledge processes, personal and professional relations, and mediations, but also in feelings of belonging and identities (Akkerman and Bakker 2011a).

Accordingly, a second worthwhile direction for research is to identify a set of methodological indicators or markers by which diversity as well as consequent discontinuities can be empirically detected (Akkerman & Bakker 2011a). For example, Hannele Kerosuo (2006) has introduced how boundaries in action can be traced. She found three types of verbal markers that can function as fragile signals in social interactions: (1) metaphors of boundaries (such as fences, walls, limits), (2) actors' attributes and definitions of social relations (we vs. they), and (3) references to different locations (Kerosuo 2004).

In the present study, I am analysing the interaction and talk of the participants from the video and audio recordings. I am tracing the episodes which are illuminating boundaries as they are being negotiated and re-shaped during the interaction and talk. I am also tracing boundary crossing episodes and the consequences of them. The selection of the data is based on the following criteria (to be revised before the analyses are concluded).

1) The episodes demonstrate *boundaries* understood as 'socio-cultural differences leading to discontinuities in action and interaction in various ways at various times' (Akkerman & Bakker 2011a, 6). These socio-cultural differences, for example, in values, motives, pedagogical goals and in learning activities, are analysed and interpreted, and the consequences of differences and discontinuities are interpreted. The discontinuity taking place in the talk and interaction may manifest some kind of a boundary, gap or rupture hindering the continuity of collaboration in co-designing and implementiof of the study visits in and across extended learning environments.

2) The episodes demonstrate *boundary negotiation* as social constructs emerging in an on-going interaction and talk during the planning meetings

of collaborators, during the implementation and integration of study visits into school practices, and during the interviews of participants.

3) The episodes demonstrate boundary crossing as a social construct emerging as a result of an on-going interaction and talk in which participants of the research have negotiated on or have entered into the new territory which they feel unfamiliar with. In other words, the participants are facing a different perspective on routine or implicit or explicit rule than what they are used to. These boundary crossing episodes can be traced by searching for episodes in which participants are using expressions demonstrating that they don't agree on something or that they have a different point of view to the issue. They may even articulate direct commands manifesting that something should not be done.

## EXPECTED RESULTS

This ethnographic study will illuminate how boundaries and boundary crossing are made visible in talk, interaction and actions of the participants whilst the teachers and experts representing museums are collaborating in order to co-design and implement expanded learning situations and contexts. This study will provide new insight on the boundary negotiation and crossing practices as social constructs which are emerging in an on-going interaction and talk during the collaboration. In another article, I will report the results of the analyses from the perspective of boundary objects, because the creation and management of them is among the key processes 'in developing and maintaining coherence across intersecting social worlds' (Star & Griesemer, 1989). It will also illuminate learning and bridging of learning in and across school and museum settings.

## CONCLUSIONS

This multi-site ethnographic study aims to provide new understanding on the processes of establishing new practices and routines in expanded learning environments. The study illuminates how boundaries, boundary negotiation and boundary crossing become evident in social interaction between participants in collegial and multi-professional collaborative and creative co-designing process of and implementing the museum visits. The study also sheds light on the ways in which boundary negotiation and crossing are intertwined with collaboration and co-design processes of experts representing the school and the museums.

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# Solving cross-disciplinary problems in co-located temporary multi-organizations

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## ABSTRACT

*This paper addresses the question of how a temporary multi-organization coordinates its collaborative problem solving in a co-located setting. To understand the phenomenon empirically, we compared two cases on coordinating cross-disciplinary problem solving in two IPD-based large-scale hospital projects located in California, USA. We observed the coordination practices that took place in a co-located facility shared by different companies. We stayed for three weeks on each site and conducted altogether 72 interviews. The study presents systemic interdependence as a new interdependence to coordination theory. This interdependence found in the temporary co-located multi-organization is coordinated by over-communication through scheduled and unscheduled cross-disciplinary meetings. A liaison makes sure right people attend right meetings. In addition, it was noticed that overhearing helps in reducing latency in problem solving. Cross-disciplinary problem solving requires trust and a cultural change in the AEC industry which can be enhanced through collaborative decision making, common project goals, and early involvement of key participants.*

## KEYWORDS

*Systemic interdependence, Over-communication, Overhear, Integrated Project Delivery, Temporary organization, Co-location, Construction industry, Knowledge collectivity*

## INTRODUCTION

The AEC (architecture, engineering, and construction) industry is highly fragmented, which causes challenges for knowledge sharing and collaboration (Barlow 2000, Dulaimi et al. 2002). Fragmentation is manifested in the separation of design and construction, lack of

coordination between functional disciplines, and insufficient communication. Conflicts and low productivity in the AEC industry is generally discussed to be caused by fragmentation. (Xue et al. 2005)

Inter-organizational cooperation and integration are important for innovation in construction (Blayse & Manley 2004, Rutten et al. 2009). The traditional contract forms, such as design-build or design-bid-build, are not enough to coordinate construction project participants when projects are complex and face lots of uncertainty (Barlow 2000). Integrated Project Delivery (IPD) is a new form of relational project delivery agreement, at least between owner, designers and contractor, aiming at enhancing coordination and creating a collaborative atmosphere by aligning the goals of all team members (Kent & Becerik-gerber 2010). On the other hand, Dossick and Neff (2011) discuss that cultural and organizational boundaries hinder collaborative work, communication, and joint problem solving regardless of contractual agreements.

The team formed in the IPD project can be characterized as a temporary organization working on inter-organizational complex work tasks needing a lot of problem solving and coordination. Little is known how work is coordinated and accomplished in temporary organizations (Bechky 2006). This paper addresses the question of how a temporary multi-organization coordinates its collaborative problem solving in a co-located setting. To understand the phenomenon empirically, we compared two cases on coordinating cross-disciplinary problem solving in two IPD-based large-scale hospital projects located in California, USA.

## THEORETICAL BACKGROUND

### **Coordinating reciprocal interdependencies**

Coordination is critical for the organizational performance (Kogut & Zander 1992) and dependent on the underlying processes of decision making, communication, and the perception of shared objects (Malone & Crowston 1994). We define coordination according to Van De Ven et al. (1976, p. 322) as the linking or integration of organization's different parts to accomplish a collective set of tasks. We view an organization as an information system being "composed of people and groups of people in order to achieve a shared purpose through a division of labor, integrated by information-based decision processes continuously through time." (Galbraith 1977, p. 3)

Organization design seeks the fit between the costs of integration and the benefits of specialization (Thompson 1967). As Kogut and Zander (1992, p. 502) write: "Productivity grows with the division of labor but specialization

increases the costs of communication and coordination.” For Mintzberg (1979) organization design is the structure of an organization and it can be described as “the sum total of the ways in which its labor is divided into distinct tasks and then its coordination is achieved among these tasks”. In this paper, we define organization design as work design: “The system of arrangements and procedures for organizing work.” (Sinha & Van de Ven 2005, p. 390) When managing inter-organizational work, an important question is which tasks should be performed by companies specialized to them and which tasks require integrating knowledge of different companies.

Thompson (1967) presents three types of task interdependencies: pooled, sequential, and reciprocal, and three modes of coordination: standardization, planning, and mutual adjustment to manage the task interdependencies. Reciprocal interdependencies between activities at the construction site dominate in construction projects and require continuous adjustment of the plans (Bankvall et al. 2010). Thompson (1967) characterizes reciprocal interdependencies as tasks that provide input for each other in a mutually interdependent way. This requires that people executing these tasks communicate frequently and adjust mutually during task execution because uncertainty is high and there is lots of unanalyzable data, i.e., tacit knowledge. Mutual adjustment is represented e.g., by unscheduled meetings, ad hoc communication, cross-functional teams, or physical proximity. (Thompson 1967) Scarbrough (2004, p. 1595) found in his study that physical co-location of project team members enabled the team “to overcome specialist knowledge boundaries to collectively develop and invest in shared project-specific practices”. Co-location enables problem solving across different interdependent parties (Okhuysen & Bechky 2009).

### **Coordination and trust in a temporary organization**

A temporary organization can be characterized as flexible in form and short lived. Coordination methods in temporary organizations vary depending on the structural context of practices, and for example prototypes and role structures are means for coordination. (Bechky 2006) On the other hand, Meyerson et al. (1996) claim that temporary groups function based on swift trust as the group has no time to engage in confidence building activities or has any formal coordinative structures supporting the work, and still they need to work on complex tasks.

The construction projects are discussed lacking trust between organizations. Problem solving is easier when project team members trust

each other but problem solving is also important for building trust (Khalfan et al. 2007) Barlow (1998, p. 96) studied inter-firm partnering and found that, “The emergence of trust arising from the partnering process may be a key factor in transferring knowledge between organizations.”

The construction project team is fragmented into different professional disciplines from different organizations, and the individuals do not share the same organizational culture or working methods. Each discipline has its own language and knowledge, which challenges the codification and transfer of knowledge (Bresnen et al. 2003). “Coordination and integration of knowledge across organisations is critical for successful project delivery” (Barlow 2000, p. 986).

In an IPD project, a temporary organization is formed between organizations. In practice, pure IPD projects apply the following coordination methods: early involvement of key participants, shared risk and reward, multi-party contract, collaborative decision making and control, liability waivers among key participants, and jointly developed and validated project goals (Lahdenperä 2012). Trust, respect, and good working relationships are important for successful IPD projects (Kent & Becerik-gerber 2010).

## METHODOLOGY AND DATA

### **Comparative case study on coordinating cross-disciplinary problem solving in two IPD projects**

We examined two cases of IPD-based design and construction projects during fall 2012. The construction projects were hospital projects in California, USA. The projects differed in their contracts which made them theoretically interesting. The unit of analysis is the coordination of the cross-disciplinary problem solving that took place in a co-located facility. The case study strategy allows examination of a contemporary phenomenon that is difficult to separate from its context (Yin 1989). The two case studies were conducted in USA, California as part of Model Nova (New Business Model based on Process Network and Building Information Modelling) work package of Built Environment Process Re-engineering research program which is coordinated by the Strategic Centre for Science, Technology and Innovation of the built environment (RYM Ltd.) in Finland.

The projects have the basic similarities in regulation through OSHPD (Office of Statewide Health Planning and Development), a fire marshal, and an accessibility review. Both studied projects are regarded successful

because both are on budget and on time at the time of research. The hospitals will feature state-of-the-art medical equipment and seismic safety. Both projects aim at LEED (Leadership in Energy and Environmental Design) certification. (Table 1) In both projects the general contractor is the same company, a matrix organization with low hierarchy, and the company invests in team building and communication by using open office environments. The general contractor company provides construction management services, builds drywall and concrete, and has previous experience on hospital projects.

**Table 1. Characteristics of the studied IPD projects**

	<b>The UCSF Medical Center at Mission Bay in San Francisco</b>	<b>The Alta Bates Summit Medical Center in Oakland</b>
<b>Features of the hospital</b>	<ul style="list-style-type: none"> <li>- 289-beds children's, women's and cancer hospital: a 6-story hospital, outpatient building with helipad in the city, and an energy center. Opens in 2015.</li> <li>- Owner: Public organization, the University of California, San Francisco (UCSF).</li> <li>- Aims at LEED gold certification</li> </ul>	<ul style="list-style-type: none"> <li>- 243 medical and/or surgical and acute rehabilitation beds children hospital that includes 11-story tower and rooftop utility plant. Opens in 2014</li> <li>- Owner: Private non-profit healthcare provider Sutter Health in Northern California</li> <li>- Aims at LEED silver certification</li> </ul>
<b>Cost &amp; schedule</b>	<ul style="list-style-type: none"> <li>- 1.5 billion dollar project</li> <li>- Design started in August 2007, 4-year construction started in December 2010</li> </ul>	<ul style="list-style-type: none"> <li>- 300 million dollar project</li> <li>- Design started in 2007, 3-year construction started in July 2010</li> </ul>
<b>Organization</b>	<ul style="list-style-type: none"> <li>- 29 design and construction companies co-located in June 2009</li> <li>- General contractor had a GMP (guaranteed maximum price) contract with the owner. Incentive milestones based on schedule and completion.</li> <li>- Project divided into building teams and clusters charged with creating construction models and documents</li> <li>- Team building and design of a temporary organization through a one week boot camp in March 2009 together with the general contractor, owner, designer and key DA/DB partners. Virtual construction during the project.</li> </ul>	<ul style="list-style-type: none"> <li>- 12 design and construction companies in an IFOA contract. Partial co-location of the designers, other fully co-located. Other 26 design and construction companies are not co-located.</li> <li>- Team building through virtual construction before breaking ground.</li> </ul>

The highly complex design and construction process of a hospital can take 10 years to design and build during which many inevitable changes take place creating high uncertainty to the process. For example, the owners may change the spatial program due to changes in hospital business models or models of care delivery, or the owners may have less financial resources than originally planned to build the hospital. In addition, equipment technology used in hospitals advances continuously, and by the time of construction the newest technology may require different room layout than was earlier designed. During construction, even a small change affects many parts of the design and joint inter-organizational problem solving is

required. Both projects' owners requested the use of co-location in a shared facility to get people collaborate, solve problems quicker, and minimize coordination challenges due to high uncertainty of the environment.

## Data collection

We collected data using multiple techniques in order to increase the validity of data. First, we spent two days at each research site observing participants and informally talking to them. Participant observation took place in different meetings held at the sites and during participants' daily routine. We observed how inter-organizational and cross-disciplinary collaborative problem solving was managed and how inter-organizational work was organized. In total, we stayed three weeks on both sites, which was a good strategy to identify key participants of the projects and get access to rich empirical data. We took a passive observer role rather than an active role in order to minimize our impact on site practices. We attended interdisciplinary meetings, observed the interdisciplinary work in the shared facility and observed the work on-site to understand how BIM was used.

Second, we conducted altogether 72 interviews of key project participants. The interviewees represented several organizations (Table 2). The interviews were semi-structured to get rich and detailed real-life descriptions from the interviewees. The interviews lasted approximately 45 minutes. Three researchers were present at each interview, one taking the role of main interviewer and two others asking defining questions and taking notes. Finally, we examined project documents from the projects' databanks which included organization, meetings and communications, document control, cost control, scheduling, accounting, quality control plan, BIM execution plan, and contracts.

**Table 2. Data collection methods and data**

	<b>Mission Bay</b>	<b>Alta Bates</b>
<b>Observation during construction</b>	<ul style="list-style-type: none"> <li>- Period: 10.9.-28.9.2012</li> <li>- 11 meetings (~15 hours)</li> <li>- 40 pages of field notes</li> </ul>	<ul style="list-style-type: none"> <li>- Period: 4.10.-19.10.2012</li> <li>- 5 meetings (~10 hours)</li> <li>- 32 pages of field notes</li> </ul>
<b>Audio-recorded, semi-structured interviews</b>	41 interviews (1525 minutes): <ul style="list-style-type: none"> <li>- Seven owner representatives</li> <li>- Five architect representatives</li> <li>- Four construction management consultant representatives</li> <li>- 20 general contractor representatives</li> <li>- Five sub-contractor representatives</li> </ul>	31 interviews (1169 minutes): <ul style="list-style-type: none"> <li>- Three owner representatives</li> <li>- Two architect representatives</li> <li>- 17 general contractor representatives</li> <li>- Six sub-contractor representatives</li> <li>- One OSHPD representative</li> <li>- One inspector of record</li> <li>- One independent equipment consultant</li> </ul>

All the interviews were audio-recorded with the permission of the interviewees, except one interview where permission was not granted. The analysis process of the interview data followed the analysis recommendations of Miles and Huberman (1994): First, the interviews were transcribed word for word. Then the interviews were read through to get a preliminary understanding of the data collected. After that, the interviews were coded and analyzed using a qualitative data analysis software Atlas.ti.

The rich data was analyzed using systematic combining which is based on abductive logic (Dubois & Gadde 2002) to find coordination practices of the collaborative problem solving in the two IPD-based projects. During the first round of coding the transcriptions, six different codes were applied. Four codes were used based on literature review: project management, building trust, co-location, and integrator roles, whereas two codes emerged from the transcriptions during the analysis process and were regarded important for the analysis of management practices: challenges of the project and characteristics of general contractor. During the second round of analysis, we looked at the quotes selected during the first round of analysis and focused on issues affecting cross-disciplinary problem solving in a co-located facility shared by the companies.

## FINDINGS

Communication for instant problem solving was easy due to the availability of people in a co-located facility. In addition, decisions were made quickly.

“One big advantage I see is decision-making, and how fast it is to have decision making out here in an environment like this.... And very frequently just in talking to people about things, these issues get resolved. They don't get escalated into something that now suddenly needs a much higher level of decision-making to get it resolved. That's a very big pro for me out here is just the availability of people. So it's the knowledge that the people have out here, and getting issues resolved in a very efficient manner.” [Construction management, Mission Bay]

“...rather than decision making going from one to the next to the next to the next, everybody is in the room together. They talk about it. They make a decision and they go. So, I would say, overall decisions get made faster on an IPD project, which is why these projects have been able to more or less, stay on schedule much better than past projects that were not IPD.” [General contractor, Alta Bates]

Face to face meetings in the co-located facility were seen important when discussing complex issues in highly unpredictable environment.

“...There's nothing that replaces – especially when you're talking about complex things, the face to face meetings. ... the big thing that – that's difficult is the designer has five or six things that they're working on but they might not know which ones are the most



important to work on and it might change – it might change week to week. Okay, we found out that we can't do something that was really critical because of other things that happened maybe the work needed a crane, and we can't get a crane that week. That's not important anymore; now we need to move to this next item that their – and they might still be working on the item which we know we can't do. So it's that kind of – things change quickly. It's not – construction is different than you know a manufacturing facility where it's much more steady and it's more predictable." [General contractor, Alta Bates]

The individuals in a temporary organization of the IPD project have difficulties to understand what kinds of impacts different changes have on other parts of the project, and who should be informed about changes, and involved in decision making. The complex reciprocal interdependencies of the temporary organization require a lot of communication.

"...sometimes you don't know who raised the issues so we don't know who to go talk to and sometimes you go talk to this subcontractor, ... and you get it resolved but you won't look back to the fourth person who didn't know that was resolved and they went and talked to the inspector and the inspector had a different opinion and so you will have these two paths were I said "oh that's okay the user doesn't need that" but the inspector said "oh but the state fire marshal wants to see that" so it becomes a code issue and so I think it is resolved because I said it is not needed..." [Construction management, Mission Bay]

Working and collaboratively solving problems in a co-located facility shared by companies is a new way of working in the AEC industry and requires a cultural change.

"Some people are still kind of holding their stuff to the vest because they have been trained so long to do what's best for them, not necessarily what's best for the electrician or best for the plumber. So it takes a little while for everybody to really truly understand the benefit of working more as a team." [General contractor, Alta Bates]

IPD helps in working and solving problems together.

"...it [IPD] gets everybody to work together to solve a problem as opposed to pointing fingers about you didn't do this so I didn't do it." [Architect, Alta Bates]

Both projects used collaborative decision making, common project goals, and early involvement of participants to increase trust between disciplines.

"In this environment with such a big job, you have to have lots of trust for the team players who really understand what is being said and the information brought back, because you do not need twenty people in a meeting..." [General contractor, Mission Bay]

"The fact that we are doing this collaborative work and lending to this environment is more by shared goals and commitment to the project than contractually reinforced." [Architect, Mission Bay]

"... bring everybody in, bring all the experts in, let's build this together and everybody has the same goals. We're all going to be profitable at it while let's bring in all those goals, everybody has the same most to make it happen as one instead of everybody kind of fighting for themselves." [Electrician, Alta Bates]

In Mission Bay project over-communication, through many scheduled and unscheduled, i.e. ad hoc, cross-disciplinary meetings, was used to make

sure information between individuals spread, whereas in Alta Bates overhearing was seen to reduce latency in problem solving. In Mission Bay project, the general contractor used a liaison role to ascertain right individuals were present in right meetings, whereas in Alta Bates project, a liaison role was used to ascertain that information from the field gets spread to the owner. (Table 3)

**Table 3. Coordination methods of problem solving in the studied projects**

	<b>Mission Bay</b>	<b>Alta Bates</b>
<b>Over-communication and overhearing through scheduled and unscheduled cross-disciplinary meetings in a shared facility (co-location)</b>	“We try to <b>over-communicate</b> . So we have the coordination meetings. They are supposed to bring up, highlight that, daily huddles in the field if there are issues. We have the owner’s meetings. We have the PSG [project solutions group] meetings. And all of those are supposed to make sure what is being talked about that information is spread out.” [General contractor]	“...being in the same room with everybody and sitting next to the different trades is that you <b>overhear</b> conversations. If things come up and people are speculating about items that you know something about, or that they would not normally ask you about, ..., they can just yell over and ask what is going on here. ...the more we work closer together, the better the communication is and it is amazing the number of things that are resolved before they become big issues, just by having that quick communication. The right people are brought into the conversation earlier because of that.” [Mechanical coordinator]
<b>A liaison role</b>	“Helping <b>set up the meetings</b> and make sure they take place. Make sure that the <b>right people show up to those meetings</b> . So that would be all the subcontractors that are doing work on the site, making sure that they have the right people in the meetings” [General contractor]	“I am really kind of like the <b>liaison between the field and the owner</b> . So what I mean by that, I have ... there are four other superintendents and two foremen that are putting work in place and supervising out there. And then I am kind of like, like I say the guy in the middle so to speak between the owner and the field.” [General contractor]

## CONCLUSIONS

Problem solving in the temporary organization of the IPD project is non-routine and complex, and the unstable and unpredictable environment poses great uncertainty. In addition, a lot of information needs to be handled during problem solving and different disciplines have several interdependencies. We suggest that Thompson’s (1967) characterization of reciprocal interdependence, as outputs of each task providing input for each other in a mutually interdependent way, is not enough to describe the nature of interdependencies between disciplines in the temporary

organization. The difference is that the individuals from different disciplines do not know who is affected by a given task and who should be involved in solving a specific task. The boundaries between firms and disciplines cause challenges to identify the interdependencies between different work tasks of different organizations and understanding who should be involved in which tasks in which order, to finalize their specialized tasks (Okhuysen & Bechky 2009).

This paper contributes to organization theory by suggesting that the interdependence found in the temporary organization can be characterized as a systemic interdependence that is new to coordination theory. The study shows that, in one temporary organization, the systemic interdependence is coordinated by over-communication through scheduled and unscheduled cross-disciplinary meetings taking place in a co-located facility shared by different companies. A liaison makes sure right people attend right meetings to ensure that the right information is distributed to required parties at the right moment. In addition, it was noticed that, in the other studied temporary organization, overhearing helped in reducing latency in problem solving. It needs to be further studied why one temporary organization used over-communication and the other organization overhearing. Cross-disciplinary problem solving requires trust and a cultural change in the AEC industry, which can be enhanced through collaborative decision making, common project goals, and early involvement of key participants (Lahdenperä 2012).

The temporary organization formed between companies in an IPD project can be characterized as a knowledge collectivity. Lindkvist (2005) describes knowledge collectivity as an organization that operates on distributed knowledge, and the individuals learn through problem solving. The knowledge cannot be captured and comprehended by one single person. “Instead of being shared among community members, the knowledge base is highly dispersed and individualized among collectivity members.” (ibid. p. 1200) Through the problem solving taking place in co-located shared facility, the parties of the IPD project learn how to work with each other and create an “inter-organizational collaboration culture” (Henisz et al. 2012).

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# Public procurement contracting as a collaboration process

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## ABSTRACT

*One of the main obstacles to successful procurement has appeared to be that public procurement contracting is often not identified as contracting, not to mention collaboration to produce good procurement. Instead, it is commonly perceived as a series of legal formalities which are to be fulfilled accurately. This prevailing attitude and its reasons arising from theoretical understandings constitute the core of our paper. The alternative we advocate is public procurement contracting as a collaboration process whose goal is good procurement. The essence of contracting is here seen as enabling collaboration which is mainly understood as the enhancement of knowledge sharing. As a research outcome, we present a general process model of public procurement contracting.*

## KEYWORDS

*Public procurement, Proactive Law (PL), Proactive Contracting (PC), trialological learning, boundary object*

## INTRODUCTION

The economic and social value of public procurement is huge, as are its frequently discussed problems. Many of the problems are directly or indirectly caused by the legal influence. Public procurement is defined by legal rules and on the case level by legal contracting documents. Laws and contracts are in general formulated for legal interpretation purposes and business contracts have mostly become to be considered as legal documents. Public procurement is nowadays commonly understood as a competitive tendering system instead of purchasing i.e. as contracting about a business deal. The ultimate goal of public procurement contracting should be to produce successful procurement.

The competitive tendering system, originating from EU, emphasizes free competition and seeks to prevent favoritism. The regulation is, thus, expected to benefit European companies and public procurement. More often than not the actual consequences of legislation are not seriously pondered and unwanted implications occur. The public procurement regulation has induced a complex, formal system. In companies and in public sectors, mastering the competitive tendering system has become the ends itself and the ultimate target, successful procurement, is left aside. Likewise, when business contracts are seen as legal documents most effort is used on legalize and the ultimate goal of contracting, i.e. a successful business deal, becomes secondary. Due to the legal and administrative control and command tradition, public procurement processes and documents are usually difficult to understand and forbidding. They have not been developed for furthering collaboration. Public procurement following the logic of collaboration provides a better platform for buying and selling products and services that are suited for their purpose. In collaboration, the focus turns to enabling knowledge sharing, motivating and inspiring. In this paper, we attempt to give a new turn to thinking towards the logic of collaboration in public procurement contracting.

## METHODOLOGY AND DATA

We have studied five public procurement cases in two municipalities. The research approach in our study was a combination of action research (Gummesson 2000) and case study. We have conducted three developmental process simulation projects according to the SimLab process simulation method (Smeds et al. 2006) to reveal practices in public procurement processes and related contractual practices. The main data collection methods have been semi-structured interviews (66), participation in and observation of the process simulations and workshops which all were audio and/or video recorded and the recordings transcribed. In addition we used secondary written documentation.

As a research outcome, we have developed together with our studied partner organizations a general public procurement contracting process model. The adopted action research approach has enabled this co-development as systematic data collection and analysis is combined with the usage of practical experience. The model clarifies the process as a contracting process based on the Proactive Contracting (PC) thinking. Additionally, it includes slides with further 'what to do' information. In procurement practice, it can be used for training and information sharing

as well as a check-list. The functionality of the model as a facilitator of knowledge sharing was tested by some municipalities during spring 2013.

## THEORETICAL GAZES

In our scientific traditions, concepts have often been understood as conscious, literal and disembodied. Like seeds, words and thoughts have been seen as something which may be transferred in containers, as more or less unchanged. Legal language and its ideal of clarity are largely based on this understanding. It has, though, been argued that human thought processes are largely metaphorical and that our conceptual system is mostly metaphorically structured (Lakoff & Johnson 2003). Metaphors are imaginative rationality, uniting reason and imagination. Besides being linguistic and conceptual, metaphorical thought is embodied. Metaphors are open-ended and thus more whole than definitions. When metaphors are understood as our way of having a reality, the question will not be what they mean but how they *work*. A metaphor is not asked to validate a rule of logic, the question is what logic and reality it constitutes and *enables* (Winter 2001, 58, 65-66).

George Lakoff and Mark Johnson (1999, 3, 11) present as three major findings of cognitive science - "any kind of mental operation or structure that can be studied in precise terms" - the following: "The mind is inherently embodied. Thought is mostly unconscious. Abstract concepts are largely metaphorical." They attempt to reveal what changes in the deepest philosophical assumptions in our culture would follow if the above mentioned empirical discoveries would be acknowledged. Our basic philosophical beliefs are tied to our view of reason. If human rationality is not what our philosophical tradition has held it to be, rethinking is required as these assumptions determine scientific results. Our conceptual systems emerge from our embodied minds and most of our concepts are metaphorical. (Lakoff & Johnson 1999, 3-8, 552)

When human cognition is seen as metaphoric internalized metaphors enable or disable particular kind of thinking. In this paper, we ponder the influence of the analytic and synthetic frames of mind and their connection on research concerning public procurement contracting. We present them as metaphoric gazes which have their consequences in academic thinking. Ultimately, we seek a functioning balance between these oppositional perceptions on every level of the continuum.

*Analytic gaze and attitude.* Analytic attitude is here understood as a gaze, which divides wholes into parts to be analyzed separately. Phenomena are



defined and classified as being *either* this *or* that. The biased appreciation of rationality in human reason is a result of the analytic attitude. Observation is accordingly often based on particular rationality and logic through which things are explained. The observer is seen as external and neutral. The ideal is that of objective research. Research is considered objective when transparent research methods are used. Results achieved with the correct use of accepted methods are regarded valid. Validity in relation to real world is secondary. Analytic mind could be seen as active, as forming ways of understanding. It creates worlds of theoretical clarity where the messy practice may be mastered. In analytic research, theory and practice are usually strictly separated and non-analytic aspects are considered belonging to the domain of practice.

*Synthetic gaze and attitude.* Synthetic attitude is here understood as a gaze, which connects things and sees them forming a holistic and interactive unity. From this wholeness emerges something new which is more than its parts. Phenomena are seen as *both* this *and* that. The observer is part of the process. Her influence and subjectivity are admitted and considered. The adopted research attitude is self-reflexive. The starting point is the researched phenomenon itself as it appears to the researcher in a particular environment. Methods arise from the studied phenomenon and environment i.e. from the real world. Synthetic mind could be seen as passive, as receiving understanding. It attempts to listen to the real world and practice as they appear. Synthetic research includes all aspects of reality in its interest areas.

## COLLABORATION PROCESS AS A SYNTHETIC EXPERIENCE

Knowledge sharing faces great challenges in most business contracting processes and networks: People who make the contracts are not the ones who implement them, changes occur, actors with different backgrounds and tasks look at the process from different angles and backgrounds, and so forth. More often than not, the idea of the contracting process is scattered into disconnected details and the sight of the whole is lost. Due to the public procurement environment and legislation the tendency towards this state of affairs is increased in public procurement. The other contracting partner, e.g. municipality, is in itself a many-sided organization where various minds with differing logics and goals are involved, from end-user citizens to policy makers and employees working on separated silos of the organization. Silos tend to operate independently according to their own logic which leads to a drain of holistic operation. The challenge is to promote the ability of collaborators to know what is expected of them in the

contracting process as well as to distinguish the basic idea of the collaboration process and their own role in it. If the basic idea of an activity is overshadowed by unconnected actions, one may doubt whether its goals will be reached.

Collaboration processes are by nature dynamic: they are influenced by their environments and by their actors who are human beings with human mind and emotions. If we see collaboration as a dynamic and holistic process where new value emerges, our thinking is synthetic rather than analytic.

The main stream legal research concerning contracting is dominated by the analytic gaze. Legal thinking is mostly about analyzing texts. Jurisprudence focuses on legal interpretation rules and principles, legal concepts, classifications and systems. Ideal interpretation rules are neutral and transparent. Jurisprudence mostly ignores the world outside of law. Boundaries of law have been widely discussed but the prevailing understanding still emphasizes the independence of legal interpretation from external influence. As legal interpretation serves practical purposes in real world societies, aspects outside of law cannot, though, be completely avoided. This is even more obvious in welfare state and EU law which set social goals to be realized as legal obligations. The social consequences of the fact that statute law is mainly drafted for legal interpretation purposes is an even more ignored aspect in legal discussions. The actual versus intended consequences of legislation are mostly discussed in the margins of legal research, like in the sociology of law, however, laws (and contracts) as working tools, for a social purpose instead of as objects for legal interpretation, have not been seen as a theoretically interesting theme. Even if e.g. clarity and plain language (on this discussion e.g. Assy 2011) as well as visualization (e.g. Brunschwig 2001, Sherwin 2011) have become topics of interest in legal discussions, as long as law is seen as legal interpretation, laws and contracts as working tools are bound to remain in the margins of legal discussions, as merely practical concerns.

Even if the analytic gaze is still prevailing, the synthetic gaze is far from non-existing in academic discussion. The phenomenological attitude (our understanding is inspired by Heinämaa 2000) for one could be seen as a largely synthetic orientation. It emphasizes the importance of a freshly experienced observance, inducing us to attempt to release ourselves from the existing belief structures and preconceptions, to see things anew. The researcher is an embodied being in an experience instead of a 'neutral' observer applying transparent, i.e. objective, theories and methods to explain external phenomena.

Through phenomenological lenses human collaboration in an environment is observed with respect to its many-sided nature instead of diminishing it to fit prevailing theories. This means halting to observe things in wonderment instead of hastening to define or interpret them as well as readiness to see others in their otherness. When we label others and their thinking according to our existing categories, we no longer listen to them; we hear them according to some particular pre-understanding. Wondering is connected to enabling – providing space for individual becoming. When philosophy is seen more as wondering, it admits the limits of rationality. An attitude of wonder encourages listening. When collaboration is seen as interaction and knowledge sharing, the importance of listening becomes apparent. In contracting, most problems are due to unquestioned erroneous perceptions or unsuccessful or neglected knowledge sharing.

In phenomenology, focus is on movement like on following the movement of someone's thinking. When the source of understanding is seen to be participation in a reflexive experience, the perfect fulfillment of a plan can be seen as a failure. (Parviainen 2006, 50) That would show that no actual reflexive participation has happened. To view systems as continually-developing processes of understanding and learning increases both the reactive and proactive ability as well as sensitivity of the system. The system becomes more self-reflexive.

## PROACTIVE AND TRIALOGIC CONTRACTING

Our research is based on the PC approach (the first compilation Pohjonen ed. 2002) more broadly named Proactive Law (PL, e.g. Pohjonen 2006, Siedel & Haapio 2010, Berger-Walliser 2012). PC takes as a starting point the contracting collaboration in the real world practice as well as questions arising from there. PC attempts to enhance legal expertise which promotes success in contracting collaboration. It has been developed together with cross-disciplinary academic researchers and cross-professional experts in contracting practice. In PC, ideal contracts and contracting processes are seen as user-friendly working tools for enhancing successful collaboration and knowledge sharing. PL attempts to enlarge the scope of legal interest to include the relation between law and legal instruments as realizers of goals in the real world.

The PC approach attempts to counterbalance the (contract) law approach to contracting where contracts are regarded as legal documents drafted for legal interpretation purposes in case of a legal dispute. The consequence of the legal attitude is that legalize either dominates the contracting or as a

counteraction legal aspects are more or less ignored. Most importantly, the contract law-oriented research is not beneficial to contracting practice and does not represent an accurate comprehension of successful contracting. Theoretical legal thinking tends to separate itself from practice that is often identified as the execution of theories which analytic thinking produces. Accordingly, lawyering practice is seen as mastering legal interpretation rules and principles created in jurisprudence. On the other hand, design-oriented research with participatory, experimental and exploring methods is more connected to practice and seen as more innovative and success-oriented than the analytic theory-oriented research.

Holmström, Ketokivi and Hameri (2009) are particularly interested in the relation between problem-solving research and theory-oriented academic research. They present design science in engineering and architecture tradition as an approach which differs from theory-building and theory-testing approaches which model themselves after the natural sciences. Design science research focuses on exploring new solutions and solving problems as well as on an explorative process using, for example, action research and participatory case study methods. In design science, the development of an artifact to solve a problem is searched for. In their article, Holmström et al. call conventional theory-oriented operations management (OM) research explanatory research and problem-solving-oriented design science as exploratory research. In OM research problem-solving research produces the artifacts or phenomena that OM research attempts to theoretically explain.

Rylander (2009) has compared 'knowledge work' and 'design thinking' in management studies. These represent different approaches to problem solving. The former is based on rational, analytic and disembodied epistemology and the latter on an interpretive, emergent and embodied one. Problems are, thus, framed and solved in a different manner from these different perspectives. Design thinking aims at creating something new by experimenting and learning by doing. It is not based on rationality which cherishes theory-guided verbal certainty and control. Design attitude is iterative and practice-oriented and design solutions are holistic by nature. In practice, the differences between these two approaches may not be this categorical. Nevertheless, both could learn from each other.

When contracts are considered as enablers of successful collaboration, design thinking could balance legal thinking by emphasizing dynamic flexibility, skills, embodied emotions and the figuring of one's way around constraints. Design thinking is an emerging field also in PC, especially visualization (e.g. Berger-Walliser et al. 2011). Visualization is a core

element in design. Eppler and Platts (2009) emphasize that visualization is a powerful process enabler. Through the eyes of design thinking, contracts can be seen as boundary objects (Carlile 2002), i.e. mediating artifacts or instruments which facilitate the crossing of knowledge boundaries in cross-professional collaboration. In design thinking contracting can be seen as an activity of social prototyping, as an iterative, evolving and innovative process that is grounded on the participating parties' subjective understanding, as opposed to control-oriented and technical approaches, which strive for objective rationality. Paavola and Hakkarainen (2005) have distinguished a *trialogical approach to learning*. It concentrates on interaction through boundary objects which they call mediating artifacts or processes of activity. Interaction is not, thus, seen as an action just between people, or between people and environment but facilitated with the help of a boundary object. On one hand, boundary objects facilitate collaboration. On the other hand, they are further developed in collaboration processes. Inspired by this concept, the contracting process could be called *trialogic contracting* to emphasize the additional need to also reflect the functionality of its working tools and methods, so that they would be user-friendly facilitators of knowledge co-creation and knowledge sharing.

Visualization facilitates the sharing of knowledge. It concretely makes the invisible visible. Visual meaning making is often more effective than textual communication. People are drawn towards visual representations and are able to comprehend their messages at a glance. Emotion is critical for the appropriate direction of attention (Damasio 1999, 273). A much better way to protect the realization of the actual will of the contracting parties is to facilitate their common understanding than to dispute in court afterwards. If people are expected to familiarize themselves with information, according to the principles of user-centered design, the representation of this information should match the needs of its prospective end-users. User-centered information should be easy to find, timely, match the context of use, be catered in the amounts appropriate to the user and context, be presented in a usable format, be written in language comprehensible to the reader, be perceptually attractive, and finally for the user to enable the elaboration and development of the information through participation. (Beyer & Holtzblatt 1998)

In our research project, we have been able to observe the influence of the legal and formal requirements in public procurement: how they have

clouded the actual purpose of the procurement activities and drawn the attention towards avoiding appeals to the market court. As public procurement regulation and the competitive tendering system are complex to comprehend and forbidding to approach they are easily misunderstood, ignored or followed formally and over-cautiously. They rather prevent than enable successful procurement collaboration. To clarify the nature of the contracting process we have developed, together with experts in public procurement practice, a general model which illustrates the planning, implementation and follow-up phases of the public procurement process seen as a contracting process. The visual model aims at wiping the legal mist over the process and illuminating its basic idea. In the model, the competitive tendering phase is in turn shadowed.

Our model (appendix) tends to clarify the public procurement contracting process and its essential features as a whole. The preliminary analysis of the usability tests of the model seems to suggest that the model helps people to form a coherent picture of the process and to place the knowledge they already possess, especially if they are accustomed to abstract thinking. The model helps to build a novel attitude towards procurement activities and thus promotes a change of attitude and culture in public procurement. When procurement follows the general contracting model, it provides fruitful grounds for an innovation friendly public procurement in the bulk of public purchasing advanced by Uyarra & Flanagan (2010).

## CONCLUSIONS

Academic thinking is about viewing things through particular perspectives. Analytically-oriented science does not include perspectives outside its comprehension domain. Accordingly, consequences of this choice remain more or less unrecognized. A search for a balance between aspects considered contradictory is required in academic research. If activities which are based on synthetic logic are observed through an analytic gaze, they are not properly understood and their development is not based on their reality. Theoretical approaches are like metaphors: they enable or disable us to think in certain ways. In our traditions, we have various options but the analytic metaphor is a dominating one and apter to cause distortions. Theoretical training may, thus, have serious consequences in various spheres of practice. Into the bargain, these consequences remain theoretically uninteresting as well as the viewpoints which are not included

in the hard core of dominating scientific approaches. These viewpoints and connected skills are left for practitioners to learn in practice the best they can. More than that, they may even need to learn away from their adapted professional gaze to obtain the skills required in their work. There is much demand for innovation and co-creation in today's business and research. The ability of purely analytically-oriented research to enhance these might be seriously questioned as the enablers of innovation and co-creation seem to be located more on the synthetic side.

Contracting practice is, accordingly, continuous search for a balance between freezing and flowing. Success of contracting collaboration is largely based on the ability to form secure frames as well as to create space for flexibility and change. Contracting collaboration is both business target-oriented planning and a dynamic learning process. Target-orientation as well as control and command attitude are encouraged by the analytic gaze. Interactive and contextual collaboration processes flowing towards new innovations are instead encouraged by the synthetic gaze. The logic of contracting practices and tools has enormous social significance which should not be ignored and left solely to serve the needs of legal interpretation.

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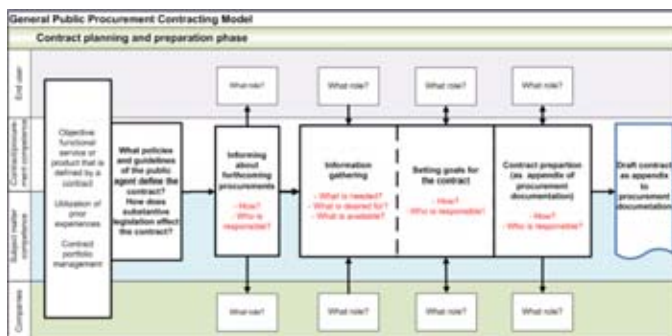
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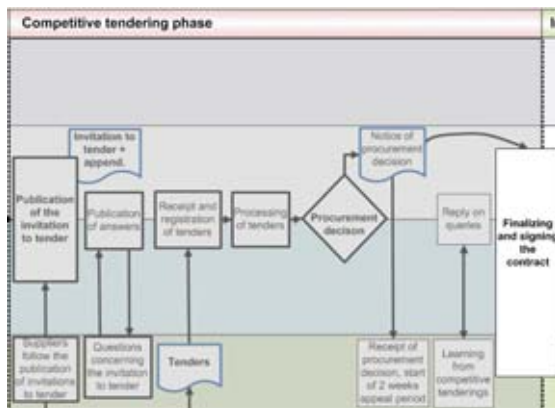
## APPENDIX. The General Public Procurement Contracting Model



## Complete model



## First phase: Contract planning and preparation



## Second phase: Competitive tendering



## Third phase: Implementation and follow-up/contract period

# An International Living Lab Innovation Management Model: Empirical Experiences from Sino-Finnish ICT Collaborations

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## ABSTRACT

*A Living Lab is an environment for user-driven open innovation in the real life contexts where users co-create innovations with other partners. The “Co” of Co-creation in Living Lab is a Public-Private-People Partnership. Recently, Living Lab concept has scaled up from original smart home-like environment to smart communities (e.g. city) to the networking of regional and international Living Labs. Although there are numerous studies on how to co-create new products and services by involving users in the Living Lab contexts, it seems that little research has been done on the innovation management of Living Lab networks. In this paper, we build a Living Lab innovation management model based on many years of practice experiences from several Sino-Finnish Living Lab ICT collaborations in different domains. This paper contributes to the theory and practice of Living Lab innovation management.*

## KEYWORDS

*Living Lab, Co-creation, Innovation Management*

## INTRODUCTION

While the Open Innovation model proposed by Chesbrough (Chesbrough, 2003) become more and more popular nowadays, involving users in the innovation processes is still considered to be complex (Hyysalo, 2003, Ståhlbröst, 2008). Many reasons concerned for this are related with the lacking of structure and governance for user involvement and the understanding their needs (especially the hidden ones) in the real life contexts (Almirall and Wareham, 2008, Stappers et al., 2009). One emerging Open Innovation approach called “Living Lab” (LL), which

provides a structure and governance for user involvement and understand user needs in the real life contexts, has gained increasing interest and momentum in both industry and academia recently (Almirall and Wareham, 2009). The concept of LL was introduced by Professor William Mitchell from MIT Media Lab and School of Architecture and city planning (Eriksson et al., 2005). The original idea of LL was to construct a home-like smart environment by ambient intelligence and ubiquitous computing technologies such as wireless and sensor technologies to sense, prototype and validate complex ICT solutions (Ståhlbröst, 2008). Later, the LL concept has scaled up from smart home-like environment to smart communities (e.g. city) to the networking of regional and international Living Labs (e.g. the European Network of Living Labs – ENoLL).

Although the research on innovation management has been an active research area for quite a long time in both academia and industry, as the relatively young age of LL innovation approach and the development of LL networks, it seems that little research has been done on innovation management of LL networks, especially in the cross-cultural and international contexts. What are the work practices, structures or technologies needed for the co-creation in the LL innovation networks? Therefore, the purpose of this paper is to fill the gap by providing experiences and insights on how to manage the international LL innovation networks.

## **Methodology**

The research methodologies of this paper are deductive and inductive analyses. First, we propose an international LL innovation management model based on literature review and our many years of international LL projects practice experiences. Then, we validate the model by three Sino-Finnish LL innovation collaborations cases in different domains.

## **Contribution to the theory and practice**

This paper contributes to the theory of innovation management in the context of international LL networks. This paper also provides practical insights and experiences for the practitioners of international LL innovation collaboration to manage their innovation processes and partnerships more effectively and efficiently.

## **Structure of the paper**

The remainder of the paper is structured as follows: Section 2 reviews the literature on innovation management; Section 3 presents the international

LL innovation management model; Section 4 validates the proposed model by three Sino-Finnish LL innovation collaborations cases in three different domains; Finally, in Section 5, we discuss the empirical experiences and lessons learned from the cases.

## LITERATURE REVIEW

As the importance of innovation, how to manage innovation has been an active research area since the beginning of innovation research. The literature on innovation management identifies four historical periods for the development of innovation paradigm, namely the technology push period, market pull period, combination of technology push and market pull period and open innovation period (Ortt and van der Duin, 2008). Many different perspectives have been studied in innovation management research such as product and technology management (Eversheim, 2008), market management (Hurley and Hult, 1998), knowledge management (WALLIN and Von Krogh, 2010), partnerships or stakeholders management (Steiner, 2008), organization management (Poole and Van de Ven, 2004) and integrative perspectives (Tidd and Bessant, 2011). Innovation management is inherently difficult and risky as it relates to many factors and aspects, especially in the fourth innovation paradigm that is characterized by more extensive alliances, partnerships and collaborations between different partners. For example, traditional linear innovation management mode such as supply chain management has developed into innovation networks management which become too complex and unmanageable for the coordination and system integration of different partners and components in innovation networks (Ortt and van der Duin, 2008).

LL is a user-centric collaborative innovation (Public-Private-People Partnership) in the real life contexts. There is no universally accepted definition for LL yet. It has been defined as methodology (Eriksson et al., 2005), approach (Feurstein et al., 2008), environment (Følstad, 2008), platform (Niitamo et al., 2006), ecosystem (Pallot et al., 2010) and organization (Molinari, 2008). In this paper, we are inclined to see LL as an innovation ecosystem or organization with different stakeholders. As the relatively young age of LL innovation approach and the development of LL networks, it seems that little empirical research has been done on innovation management of LL networks, especially in the cross-cultural and international contexts.

## AN INTERNATIONAL LIVING LAB INNOVATION MANAGEMENT MODEL

From the literature review, we see that innovation management can be addressed from different perspectives such as technology, market and organization. In this paper, we will address the management and organization of "CO" (e.g. Co-creation and Collaboration) of LL innovation in international LL project collaboration context. Specifically, we will address the work practices, structures and routines for the international LL innovation co-creation and collaboration. Based on LL research literature and our many years of international LL innovation collaborations experiences, we propose an international LL innovation management model as shown in Figure 1.



**Figure 1 An international Living Lab innovation management model**

The key stakeholders in LL innovation include government, companies, universities, research institutes and users, namely the Public, Private and People. The key activities in LL innovation include funding, Research and Development (R&D) and application of innovations (Levén and Holmström, 2008). Currently, government is still the main policy and funding supports for LL innovations (Almirall and Wareham, 2008). Therefore, in Figure 1, we can see that the model has four layers, namely government, development, research and application. In the middle of Figure 1, there are different joint activities between different layers such as joint funding, development, research and application. The main actors and the joint activities in each layer are shown in Table 1.

**Table 1 Main actors, their main roles and joint activities**

Layer name	Main actors	Main roles	Joint activities
Government	National and regional governments	Policy and funding supports	Joint strategies, funds and projects
Development	Technology companies and other technology providers	Develop innovation products and services (e.g. prototypes)	Joint development and technology collaboration
Research	Universities, research institutes	Produce and distribute new knowledge	Joint research, training and education programs
Application	End users in Living Labs	Apply and test innovations	Joint application and testing

Different organizations such as universities, research institutes, companies (including Multinational Enterprises (MNEs), Small and Middle Sized Enterprises (SMEs)) can work on different layers, which are usually organized as different Work Packages in the LL projects. The layers at the same levels talk more to each other (e.g. government layer talks to government layer) because they are in the same domain or layer. The same level dialogues or collaborations are indicated by the hollow horizontal arrows in Figure 1. To simplify the coordination process and improve the efficiency of communication, each layer has its communication interfaces or access points to other layers. For example, a university can have its key contact persons for the project collaboration coordination and communication. SMEs in the same layer can establish a non-profit company or strategic alliance as their communication interface. The access points in each layer are indicated by small hollow circles in Figure 1. The access points function as the doors of information for different stakeholders. Vertically, general coordinators coordinate throughout the whole layers, which are indicated by the vertical hollow arrows in Figure 1. The main roles of general coordinators are networking and coordination:

- **Networking:** General coordinators search, select and implement the most suitable partnerships both in horizontal and vertical directions of the international LL innovation networks.
- **Coordination:** General coordinators steer the total collaboration. They facilitate both vertical and horizontal communications.

The model includes the main stakeholders in LL innovation process and innovation management from technological, market and organizational perspectives. It combines the innovation sources from top-down (e.g. government strategies) and bottom-up (e.g. grassroots innovation sources emerged from LLs). The main activities or processes of international LL collaboration include:

- **Search** for a thematic cooperation area: find the common interests between two collaborating countries and align the strategies.
- **Select relevant partners:** Identify the best-fit partners.
- **Cooperate:** Joint cooperation or collaboration activities in funding, R&D and application.
- **Coordinate:** manage and orchestrate the cooperation processes.
- **Learn:** learn from the cooperation processes and build knowledge base for later cooperation.

The above five main activities of LL collaboration are not linear but can be concurrent. From organization's perspective, unlike many formal organizations such as companies, LLs are loosely structured organizations with their stakeholders loosely connected, especially in the international LL networks in which partners are geographically scattered around different countries and places. Stakeholders in LL networks are usually loosely linked in different work packages in specific projects. Therefore, the roles of communication interfaces in each layer and general coordinators are very important to make the information run smoothly and effectively in both horizontal and vertical directions of the LL networks instead of the anarchism.

## CASE STUDY

In order to illustrate or validate proposed LL innovation management model in the previous section, we provide empirical case studies in this section.

## **UBISERVE: the Sino-Finnish Living Lab collaboration project on Future services**

UBISERVE project is a joint research activity on Future Ubiquitous Services and Applications between Finnish and Chinese research institutes and companies in the context of Finland China ICT Alliance. The Finnish side funder is the Finnish Funding Agency for Technology and Innovation (Tekes); while Chinese side funder is the MOST (Ministry of Science and Technology) (Tang et al., 2012).

The implementation of LL innovation management model for UBISERVE project are as follows:

- Government layer: align the Finnish and Chinese ICT strategies in future services.
- Development layer: The key technologies include social Web of Things (WoT) which combines social media and WoT technologies, future wireless networking and core network technologies etc. The joint development includes combining the Social media platform in Aalto university and WoT platform in Beijing University of Posts and Telecommunications (BUPT) (Tang et al., 2012)
- Research layer: Joint research has been done in different areas such social media(Tang and Hamalainen, 2012a) and future services. There are also joint education and training programs between Aalto University and BUPT in UBISERVE project such as scholars and students exchanges.
- Applications layer: There are two selected application domains: the ubiquitous media innovation in campus and the i-Net for future mobile Internet. The LL testbeds for ubiquitous media innovation in campus include Aalto University and BUPT. The LL testbeds for future mobile Internet include Tampere University of Technology (TUT) and B-Star company etc.

The general coordinator in Finnish side is the Finnish Strategic Center for Science, Technology and Innovation in ICT (TiViT company). The general coordinator in Chinese side is the Shanghai Research Center for Wireless Communications (WiCO). The UBISERVE project has output abundant of results with scientific publications (papers and books), patents, meetings, workshops, scholar/student exchanges and International Telecommunication Union (ITU) standardization proposals.



## **ePaper: the Sino-Finnish Living Lab collaboration project on Future media**

The ePaper project is a Sino-Finnish joint project, which combines broadcast technologies and ePaper devices to create a new media platform for information distribution with ultra low power consumption and cost, targeted especially for emerging markets with no or limited information access by traditional channels.

The implementation of LL innovation management model for ePaper project are as follows:

- Government layer: align the Finland and China ICT strategies in future media.
- Development layer: the key technologies include ePaper devices and distribution technologies (e.g. broadcasting technology).
- Research layer: There are joint research, education and training activities in the ePaper project.
- Applications layer: New media platform for information distributed targeted for emerging markets. The LL testbeds are the rural areas of China.

The general coordinator in Finnish side is the Metropolia University. The general coordinator in Chinese side is the Shanghai based National Engineering Research Center of Digital Television (NERC-DTV).

The cooperation was first started at the Shanghai World Expo in October 2010. The first technical pilots have been successfully carried out in September 2011 in Finland with the leading Finnish media company Sanomat as the key partner, and in February 2012 in China with People's Daily as the key media partner. Later, based on the pilot results and feedback from media companies, a joint venture is being formed to commercialize the collaboration fruits (Kaarlejärvi and Hämäläinen, 2012).

## **Active Aging: the Sino-Finnish Living Lab collaboration project on Aging Care**

Active Aging is “a joint development, piloting and research initiative between Chinese and Finnish partners aiming at creating, studying and validating new ICT enabled service concepts and solutions for the rapidly aging population in China, in Finland and in other countries” (Tang and Hamalainen, 2012b).

The implementation of LL innovation management model for Active Aging project are as follows:

- Government layer: align the Finnish and Chinese ICT strategies in aging care.
- Development layer: the key technologies include aging care sensors (e.g. Active Life Floor which can detect elderly people's fall), devices (e.g. automatic medicine dispenser) and services (e.g. CaringTV programs which provide interactive TV programs). There are many joint development collaborations between the Finnish healthcare companies and Chinese partners (e.g. localizing the aging care products and services in China).
- Research layer: Joint research has been on the comparative studies of elderly people behaviors in Finland and China.
- Applications layer: the Active Life Home (ALH) concept, in which elderly people's home is furnished with integrated different kinds of sensors, devices and services for healthcare, entertainment and wellbeings. The LL testbeds include the senior homes, residence communities and hospitals in Helsinki and Espoo of Finland and Shanghai, Beijing and Wuhan of China.

The general coordinator in Finnish side is the Aalto University. The general coordinator in Chinese side is the National Engineering Research Center for Broadband Networks & Applications (BNC).

The ALH concept was first demonstrated at the Shanghai World Expo in October 2010. With the rapid collaboration development, currently, the ALH LL experience and demonstration rooms are created in Shanghai, Beijing and Wuhan and plan to expand to other cities in China.

## DISCUSSION

Although the three cases are in three different domains (future services, future media and aging care), they follow the same innovation management model for collaboration. For example, each case has general coordinators in both sides of collaborating countries. All the general coordinators are non-profit organizations (e.g. Universities, research institutes and non-profit companies). The reason for that might be that these non-profit organizations are neutral in interest representation, which matches the public funding nature of the LL projects. The partners in each layer of the four-layer model have their key contact persons. General coordinators take the roles of general networking and coordination (e.g. organizing the plenary meeting and workshop) to ensure the vertical direction of communication between different layers. A Customer Relationship

Management (CRM) information platform of LL networks partners' information is being created to manage the key information such as partner's general information, expertise and contact etc. LL collaboration stakeholders will maintain their own information (e.g. profile information and contact information). In this way, we can search and match collaborating partners more easily.

We summarize the key experiences and also the lessons learned during the multiple Sino-Finnish LL ICT innovations collaboration as follows:

- Focus on the main thematic cooperation areas: As the resources are limited (e.g. for SMEs), so it's important to focus on the main thematic cooperation areas.
- Select the best match partners: At government level, it's important to match the government strategies of the two collaborating parties at national, provincial and municipal levels. The same is true for universities and companies to find the best match partners.
- Ensure the smooth information flow in both horizontal and vertical directions by setting up key contacts and general coordinators: Setting up key contacts can reduce communication cost and improve coordination efficiency. For example, a university can has its key contact persons in the collaboration. SMEs can create a non-profit company or strategic alliance as their joint communication interfaces. For instance, in the Active Aging project, a non-profit company called "ActiveLifeVillage" was created to represent many different Finnish SMEs in healthcare device manufacturing and services. The general coordinators in the aforementioned three cases facilitate the vertical communication between different layers.
- Combine the both top-down and bottom-up: It's important to combine the top-down innovation sources (e.g. government strategies and agendas) and bottom-up innovation sources (the grassroots innovation sources emerging from the LL testbeds). For future-oriented innovations (e.g. future media and services), users' needs are unclear or hidden and only emerge from the interactions between users and innovations in the LL contexts. For example, in the aforementioned three Sino-Finnish ICT projects, many testings and pilots are conducted in the LL testbeds. Also, many conferences and workshops are organized by involving Finnish and Chinese students and scholars who do the user studies in the LL testbeds to get the grassroots innovation topics and directions.

- Create diversified cooperation modes and joint activities to synergize collaboration: For example, the joint funding, project, training, development, research and experiment etc.

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## Theme 3

Paradoxes in collaborative and open innovation in networks



# Friendly hacking into the public sector: co-creating public policies within regional governments

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## ABSTRACT

*La 27e Région, a French NGO, has played the role of a public innovation lab since 2008, in particular for regional administrations. The challenge of modernizing public administrations has grown over the past few decades to become an issue on the forefront of the political scene. The public sector has been transformed by reforms inspired by the so-called New Public Management, often criticized today. Partly in response to these reforms, institutions worldwide, including La 27e Région, are trying to bring co-creation values and methodologies to public administrations to radically change the way public policies are designed, inspired by social innovation. La 27e Région has conducted fifteen experiments focused on co-creation processes with nine regional administrations. The co-creation processes implemented have been guided by a framework called “friendly hacking”, which has been developed, documented and improved by La 27e Région during the experiments employing Participatory Action Research. The key components of friendly hacking are: the inside-out posture, the neutral-activist role, the doing before thinking, multilevel interactions, the envisioning perspective and hacking documentation. Some tensions and risks, inherent in co-creation processes, still subsist but the friendly hacking framework appears to be an effective way to implement radical innovation in the very specific context of public administrations.*

## KEYWORDS

*La 27e Région, Friendly hacking, Public innovation, Co-creation of public policies*



## INTRODUCTION

*La 27e Région* is a French, public-sponsored but neutral NGO that has acted as a public innovation lab since 2008. Like other public innovation labs in various countries, its ambition is to change the culture of public administrations based on the idea that administrations are full of opportunities for innovations and are not the archaic and bureaucratic institutions they are often considered to be. One of the core assumptions of *La 27e Région* is that co-creation processes, associated with specific methodologies and strong values, are key to developing innovations within administrations (Bason 2010), innovations that would improve both the quality of public services for citizens and the way administrations function internally.

To set up this transformation process with and within public administrations, *La 27e Région* is conducting various experiments of co-creation processes, which are described below. All the experiments share the same framework, called “friendly hacking” by *La 27e Région*; this common framework serves as the basis for establishing a co-creation process during the experiment that takes into account the specificities of the public sector. This article describes the key components of this framework and also discusses tensions and risks related to friendly hacking.

## THEORETICAL BACKGROUND

The question of modernizing public administrations has grown over the past few decades to become an issue on the forefront of the political scene, not only in France (Pallez 2001; Bezes 2006), but also abroad (Aucoin 1990; Hood 1991; Pollitt & Bouckaert 2006). Public administration reforms, often inspired by management methodologies used in the private sector, are often grouped under the heading “New Public Management”, even if their characteristics vary from one country to another. Baselines of “New Public Management” reforms comprise:

- Separating conception functions, retained within the “strategist State” (Bezes 2006), from execution functions, often assigned to government agencies or outsourced
- Increasing the accountability of civil servants
- Making a commitment to the rationalization and instrumentation of public actions in order to develop and measure efficiency: monitoring charts, management performance indicators, evaluation of financial gains, etc.

- Opening some services to competition and developing competition among public services in-house

At present, mixed feedback and criticism regarding these reforms have been compiled both in France and abroad. Beyond the academic world, such reforms often receive negative media coverage and some criticism has begun to emerge at the top political level. For example, the French National Assembly has produced a report stating that one reform, strongly inspired by New Public Management, has “lost five years”. Administrations themselves are changing their semantics, and are urging for more cross-entity interactions among services and for the increased involvement of citizens, while often being incapable of applying these concepts themselves in their organization and management.

Partly in response to this context, various ideas have emerged that attempt to rethink the modernization of public administrations. One of them is inspired by the rise of social innovation and its practices. Here, co-creation and co-conception of public policies become practical methodologies to achieve specific theoretical aspirations of the public sector, such as transversality and participation (Bason 2010). For Michael Harris and David Boyle, co-conception in the particular case of the public sector implies three basic assumptions: the first is that citizens-users (*e.g.* beneficiaries or patients) possess considerable information that could drastically improve the quality of public actions. The second is that families, neighborhoods, and communities are “operating systems” that cannot be ignored. The third is that some of the power, responsibility and resources should be switched from public institutions or providers to individuals (Boyle and Harris 2009).

This emerging field does not have a stable and established name as yet; however, these initiatives are all “public innovation” actions, a term that is used henceforth in this article. Public innovation initiatives can be supported by public organizations (*e.g.* Mindlab in Denmark), private companies (*e.g.* Demos in the United Kingdom), as well as structures in the third sector, such as *La 27<sup>e</sup> Région*, one of the main representatives of public innovation in France.

French regional administrations are in charge of an increasing number of public policies while having to restrict and control their expenses at the same time. This explains why their modernization currently represents a major challenge. *La 27<sup>e</sup> Région* primarily works with regional administrations, developing with them experimental programs for co-creating public policies.

## DATA AND METHODOLOGY

### Fifteen past and ongoing experiments

The results of this article are based on the two experimental programs conducted by *La 27e Région* with regional administrations: *Territoires en Résidences* (“in-residence territories”) includes eleven experiments conducted between 2009 and 2011, and *La Transfo* is a two-year long ongoing program that has been launched in four regions and was started in 2011.

***Territoires en Résidences*** consists in immersive-oriented sessions contracted with regional authorities that wish to find an alternative way for reframing a specific policy. First, a partnership and financial agreement is signed between *La 27e Région*, the Region involved and the place of the residency (e.g. a railway station, an university, a library, etc.). Then a multi-disciplinary team is set up by *La 27e Région* and works closely with the local community for three to six months, including three weeks of total immersion involving ethnographic, co-design and prototyping activities. The lessons learned benefit the local community and regional governments as well as the national network of regional governments (Jégou *et al.* 2011). Table 1 presents the characteristics of the eleven experiments carried out and Figure 1 identifies where the experiments took place.

***La Transfo*** consists in prototyping innovation labs inside regional administrations. After testing residencies, some Regional Councils expressed the wish to build their own capacity to use such methods.



**Figure 1** The two programs took place in nine different Regions

To accomplish this, a multi-disciplinary team is spending a total of ten weeks over a two-year period within the regional organization to empower a group of civil servants. They use practical cases on a specific theme to co-create the future lab. Table 2 summarizes the four ongoing experiments.

Region involved	Title of the experiment	Starting date	End date
Champagne Ardenne	"The Open Campus"	March 2009	June 2009
Bretagne	"A new involvement of citizens"	June 2009	November 2009
Provence-Alpes-Côtes d'Azur	"The low energy Region"	September 2009	November 2009
Aquitaine	"Digital start-kicker of a territory"	September 2009	November 2009
Auvergne	"The nursing home of tomorrow"	September 2009	December 2009
Nord-Pas de Calais	"The elected representative workplace environment"	October 2009	December 2009
Champagne-Ardenne	"The High Human Quality high school"	November 2009	March 2010
Rhône-Alpes	"How to inhabit a high school?"	March 2010	May 2010
Champagne-Ardenne	"Gastronomic heritage and short cycles"	April 2010	June 2010
Provence-Alpes-Côtes d'Azur	"Public digital spaces of tomorrow"	April 2010	September 2010
Bourgogne	"The rural station of tomorrow"	June 2010	October 2010

**Table 1** Location, title and date of the eleven experiments of *Territoires en Résidences*, ranked from the oldest to the most recent

Region involved	Practical cases theme	Starting date	Expected end date
Bourgogne	Rural life	June 2011	October 2013
Champagne-Ardenne	Youth policy	September 2011	January 2014
Pays de la Loire	Prospective	January 2012	January 2014
Provence-Alpes-Côte d'Azur	Youth employment	May 2012	May 2014

**Table 2** Location, theme and date of the four *La Transfo* experiments, ranked from the oldest to the most recent. Two of these four Regions were also engaged in the *Territoires en Résidences* experiment, three times for Champagne Ardenne and twice for Provence-Alpes-Côte d'Azur

## A methodology based on Participatory Action Research

Both *La Transfo* and *Territoires en Résidences* have been designed using the principles of Participatory Action Research (Whyte 1991), inspired by action research (Lewin 1948). They are indeed collective processes of self-investigation within public administrations with the explicit objective of their transformation, based on the idea that action and research must be conducted *with* civil servants and elected representatives, and not *for* them.

Participants in *La 27e Région* experiments include researchers from various disciplines such as sociology, urban planning, design and management sciences, who do not remain neutral observers but who participate in the co-creation of collective actions (David & Hatchuel 2008). Therefore, the process itself is the source of research material and knowledge, in particular thanks to documentation through blogs, videos, notebooks *etc.* These documents are public, following Open Science principles of collaborative research and copyright-free research materials.

Participatory Action Research is inherent in each experiment and is included in the contract signed before between *La 27e Région* and the Region where the experiment takes place.

## THE “FRIENDLY HACKING” FRAMEWORK

All the experiments conducted are based on a framework called “friendly hacking” by *La 27e Région*. This framework includes six key components that enable co-creation processes to happen within public administrations with civil servants, elected representatives and various partners.

### Why “friendly hacking”?

The apparent contradiction between the two terms can be explained as follows: hacking signifies the intent to challenge the robustness of public policy instruments and services, and to identify and acknowledge weak points to allow for improvement (Simon 2005). Here, the hacking is friendly, not destructive. The approach, agreed by public authorities, represents an innovation strategy that is disruptive enough to question public structures known for their inertia and conservatism. The term was selected because of the positive culture of hackers, who are innovative, curious and playful *handymen* possessing the capacity to achieve promising results, in this case in public structures. Hackers are adept in quickly recombining the existent, and thus help build trust among stakeholders both inside and outside the institution, serving to kick-start structural shifts in the culture of innovation and the practices of public authorities.

## Key components of friendly hacking

### ***The inside-out posture***

Friendly hacking relies on the confrontation of various cultures that are found at the border of the institution but which are nonetheless internal and sufficiently immersed to engage the institution's civil servants, but which are also sufficiently detached to preserve a critical point of view and relative freedom of action. The privileged mode of intervention is an immersion posture: by setting up the hacking team in a school, a library or even in the Region's offices themselves for a period of several weeks, in-depth collaboration comes about, trust is built and how the institution functions internally is clearly identified, far beyond conventional formats of participative design (Jégou *et al.* 2009). Long periods of immersion also mean that the team remains suspended in regard to periods of emersion, metabolizing the experience from the inside, stepping back and rebuilding from a critical distance. The inside-out posture creates benefits for civil servants both by allowing them to feel that they are involved as a quasi-new employee and at the same time as an external observer, free to rethink, at least partially, the public institution in question.

### ***The neutral-activist role***

Friendly hacking requires a subtle balance between neutrality (when it comes to getting people from different statuses to work together) and activism (when it comes to defending strong values promoted as a manifesto, such as freedom of speech in regards to the duty of self-restraint of civil servants). In many cases, when confronted with a mix of internal inertia, bureaucratic silos and external social, economic and environmental challenges, the public sector calls for neutral activism, driven by a set of constructive public values. *La 27e Région* works to build and maintain a position of relative independency, insisting that it is a partner and not a subcontractor. This role is materialized by a contract signed between *La 27e Région* and the Region itself before the experiment takes place; the agreement covers co-funding, specifies means but not outcomes, identifies political backing, the necessity of open source documentation *etc.* This agreement is a powerful tool used by *La 27e Région* to keep the spirit of the experiment on track until the end.

### ***The doing before thinking***

The customary local public development process tends to be based on *in vitro* project engineering, followed by large-scale deployment throughout the territory. It often lacks field studies involving users and especially

experimentation with the implementation of the solutions proposed. For instance, via a particular experiment conducted between *La 27<sup>e</sup> Région, Strategic Design Scenarios* and two French regional Education Departments (Champagne-Ardenne and Nord Pas-de-Calais), it was possible to map the process and stakeholders involved over 2-3 years in the construction of a new high school (Jégou, Vincent & Thoresen 2011). The mapping revealed, from the political decision to build the school through its inauguration, the quasi-absence of involvement of the school's future users, i.e., the students, professors and technical and administrative staff. However, it is just as necessary to involve, at the very early stage of the process, persons who are key to scaling up and implementing the project in the future (Leadbeater & Wong 2011). For example, one of the first *Territoires en Résidences* experiments was the co-creation of a nursing home. However, this experiment was carried out without the participation of the home's future director, substantially reducing the ease of implementation.

### ***Multilevel interactions***

Hacking is not the action of a single instigator, but requires the involvement of a supportive community. Similarly, transformation of the public sector calls for cooperation among territories and various levels of government along with cross-fertilization within a heterogeneous community of interest. Working with partners from diversified backgrounds allows participants to slightly change the way in which they consider a problem, which is key to allowing the co-creation processes to occur. Continuous interplay between this “macro-scope”, used to enlarge the focus and rephrase a problem, and the investigations at micro-level described above facilitates the breaking-up of technocratic silos and opens the door for multilevel governance and inter-territoriality perspectives (Vanier 2008).

### ***The envisioning perspective***

Friendly hacking is by essence oriented toward the collective construction of a desirable future. Both *Territoires en Résidences* and *La Transfo* point to the necessity to step back from the urgency of the present and take the time needed to build an image of the future and collectively agree on it. Design capabilities that simulate in tangible, realistic (feasible) fashion (by visualizing, rapid prototyping) possible alternative futures facilitate concretization of the vision into a range of ideas, projects and solutions. These capabilities also stimulate strategic interchanges among stakeholders. In this approach, foresight is no longer a theoretical exercise but a way to build actionable proposals.

### ***Hacking documentation***

Like the open-source software community, friendly hacking focuses on “opening the administration’s black box” to promote the systematic capitalization and dissemination of lessons learned for further friendly hacking and also produce high quality research material. This requires confronting administrations, which are often reluctant to publish and share real experiences, such as failures and the hidden “dirty” face of a given experiment, and not just the so-called “best practices”. Each experiment must find the most appropriate suitable type of documentation: blog, book. For example, documentation of *Résidences* consists of a day-to-day blog and an illustrated booklet published at the end of each experiment.

## **TENSIONS AND RISKS IMPLIED BY THE CO-CREATION PROCESS OF FRIENDLY HACKING**

The friendly hacking process is often described by participants, and especially by civil servants, as a completely new way of imagining their day-to-day work. Friendly hacking experiences cannot be easily forgotten since civil servants have been fully involved in the co-creation process, not only as observer but as player responsible of it. This can, however, create tensions and risks. One risk is related to the fact that the friendly hacking framework, which paves the way for radical innovations, is a highly specific environment that is difficult to reproduce. A tension concerns the desire of civil servants to use the methodologies learned during the experiment in an organization that is not familiar with this way of working.

### **The risk of “friendly-hacking” neutralization**

The co-creation of radical innovations requires both a hacking capability to effectively break down the established, heavy public structure, as well as a strong capability to compensate for the disruption caused by co-designing pertinent and innovative solutions. The temptation of repeating the process without the appropriate framework of friendly hacking and without the participation of a trained, multi-disciplinary team can lead to a “do-gooder” attitude, which is weak and flat and which results in patching projects rather than in the in-depth collective rethinking of public infrastructure and policies.

### **The tension due to lack of co-creation culture inside public administrations**

The positive, constructive and “look at old problems with new eyes” attitude developed by civil servants during the experiment is not always easy to



bring back into the day-to-day work of the administration. Even if in some rare cases, the motivation and hierarchical position of some civil servants allow them to suggest and teach new principles of work to their colleagues, civil servants usually feel frustrated to be “stuck in the old way of doing things” once the experiment is over. However, two or more persons who were part of the same experiment customarily drastically change the way they work together, recreating the methods and attitudes learned during the experiment once they return to their normal work routines.

## CONCLUSION

Since 2008 and during fifteen experiments, *La 27e Région* has developed, documented and improved a powerful friendly hacking framework using Participatory Action Research. At present, results are far from negligible in terms of changing the view of civil servants and representative elected involved in the experiments, but also in concrete change of some public policies. However, goodwill and methods are still not enough if a systemic transformation is the target, since friendly hacking takes time and long-term investments supported by diversified and patient stakeholders.

Beyond the current disruptive capacity of friendly hacking, there is a need in the future for new kinds of agreements and contracts that could improve the framework. They could support new structures (*e.g.* independent design labs working for and with multiple partners or cooperative design companies), new business models (*e.g.* based on crowdsourcing) and new governance patterns that could enable the independency required in an alternative approach to the traditional suppliers/clients approach.

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# Paradoxes in collaborative innovations in networks: The challenges of coopetition and the role of facilitation

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## ABSTRACT

*In this paper, we extend the results of Chalant & Lecloux (2009) on the challenges of coopetition in networks. We investigate the role of paradoxical injunctions in innovation success as well as the need for facilitation by a third party to manage these paradoxes. In the literature, the management of paradoxical tensions is mainly discussed with reference to intra-organizational issues (Paananen, Irrmann & Smeds 2013). This paper extends the scope of the discussion to the inter-organizational sector by analysing how paradoxes are managed in an open innovation network. In light of the literature and based on our expertise, we will present three hypotheses. Two case studies will be presented, which shed light on theoretical concepts. This paper shows that coopetition (which refers to cooperative competition through an intertwining of cooperation and competition) generates paradoxical injunctions. Second, it shows that paradoxical injunctions, if well managed, can have a positive impact on creativity and innovation. Finally, it demonstrates how the management of paradoxical injunctions can be achieved through facilitation, which can take several forms. As a result, our action research shows how paradoxes can generate creativity in co-creation spaces when they are anticipated, managed and overcome by facilitation and creative tools.*

## KEYWORDS

*Inter-organizational coopetition, paradoxical injunctions, creativity, innovation, facilitation, psychosocial aspects, intermediate coopetition*

## INTRODUCTION

In light of the current economic context, innovation has become a question of survival for businesses (Le Masson et al. 2006). Simultaneously, the limits of neo-liberal capitalism with its exacerbated individualism start to be increasingly visible: psychosocial disorders at work (burnout, moral harassment, violence), environmental issues, increasing unfairness, unemployment raise, a loss of sense of self, etc. All these phenomena are signs that a revolution and a fundamental change in our economy as well as in our way of thinking is needed to stop this “race for even more”, which is going to drive us straight into the wall. We need now to go back to common sense, to aspire to a more human economy. We are now entering a new age of capitalism, in which there is a desire to rehabilitate the collective, to re-establish social cohesion. Novel and Riot (2012) talk of “corevolution” as the tool for designing this new form of economy that is starting to appear in our society. As part of this, we can observe two tendencies: radical innovation and innovation within networks. These two tendencies have led to the establishment of inter-organizational innovation projects within a coopetition context (coopetition refers to cooperative competition through the intertwining of cooperation and competition).

However, it has been shown that such coopetition systems naturally generate paradoxical injunctions, given the notion that competition and cooperation co-exist in a paradoxical relationship. The purpose of this paper is to answer the following research questions: Can paradoxical injunctions created in innovation networks generate creativity and innovation? How can they be managed? What is the added value of intermediated competition in networks? How can emotions be mediated in order to anticipate, manage and overcome paradoxes?

Our research-action takes place within the context of Walloon competitiveness clusters. Two portfolios of inter-organizational innovation projects from two competitiveness clusters were examined on a longitudinal axis (for a period of between nine and eighteen months).

## THEORETICAL BACKGROUND

### **Coopetition**

In order to highlight some important areas for further progress and to clarify the concept of coopetition, it is important first to discuss how this concept emerged. The neologism “coopetition” represents a combining of

the words competition and cooperation. The concept was developed as a way of coping with the uncertainty and complexity of a hyper-competitive work environment (Brandenburger & Nalebuff 1996). Bengtsson and Kock (2000) describe coopetition as a collaborative dyadic and paradoxical relationship. Firms are being forced to implement antagonistic strategies in order to adapt at a hyper-competitive level. However, they must also work together and engage in collective strategies, either against other competitors or in order to pool their resources and share knowledge. Projects created in inter-organizational clusters are rich examples of this approach.

### **Paradoxical injunctions within inter-organizational networks**

Within inter-organizational innovation networks, firms simultaneously engage in two types of interaction with conflicting logics: cooperation and competition (Bengtsson et al. 2010). Given the notion that competition and cooperation co-exist in a paradoxical relationship, re-examination of the idea of paradox itself seems essential. Derived from the Greek *para*, for beyond or contrary to, and *doxa*, for opinion, *paradox* has come to connote a condition or relationship that is beyond reason or logic (Chen 2008). A paradox is a situation where antagonistic elements arise at the same time.

### ***Paradoxes in coopetition***

The coopetitive process is often described as “paradoxical, contradictory, strange and inscrutable” (Fang 2006 in Bengtsson et al. 2010: 26). A classical paradoxical tension lies in the need to be both proximate enough to collaborate and distant enough to produce novel results (Paananen et al. 2013). Partners need to cooperate to enhance the achievements of one another but they need to be simultaneously watchful of the interests of their own organization in order to stay competitive (Gnyawali & Park 2009). In this way, each partner cooperates but also tries to win over the other. Accordingly, our first hypothesis lies in the paradoxical nature of the situation.

#### **Hypothesis 1: Coopetition generates paradoxical injunctions.**

While Western tradition has tended to regard the components of paradox as two independent and opposing entities (Chen 2008), the Eastern perspective proposes a “middle way” philosophy that integrates the opposites as interdependent entities, which together form a totality. The notion of paradox as comprising two interdependent opposites is deeply embedded in the Chinese language, where several Chinese words are made

up of two characters that embrace contradictory ideas. For example, the word “crisis” comes from a mixture of “danger” and “opportunities”, showing that opposing forces interact and can lead to both negative and positive outcomes.

### ***Paradoxical injunctions as key for creativity***

In their theory of schizophrenia, Bateson et al (1956) claim that paradoxical injunctions represent situations in which no matter what a person does, he “can’t win”. Therefore, it is hypothesized that, in a restricted setting, a person caught between two contradictory and incompatible orders without the possibility of escaping – termed a “double bind” by Bateson – would not be able to find a solution except through withdrawal or developing mental illness. In this case, the individual might develop psychotic symptoms such as schizophrenia. According to Bengtsson and Kock (2000) and Gnyawali and Park (2009), the conflict between cooperation and competition is not considered as a threat but rather as a solution for management issues within organizations. Indeed, while maintaining a high level of cooperation, the competition dimension is essential in coopetition in order to maintain a creative tension within organizations (Guintana-Garcia & Benavides-Velasco 2004 in Fernandez 2011: 3).

Paradoxes engender tensions. In coopetition, the tensions come from the combination of two opposing dimensions: competition and cooperation (Bengtsson et al. 2010). Clarke-Hill and al (2003) claim that these tensions generate irregularity, instability and unforeseen behaviours but at the same time, they encourage novelty (in Fernandez 2011: 5). According to Stacey (in Fernandez 2011: 5), if the level of tensions is well controlled, it can stimulate individuals and feed creativity and innovation. Therefore, we believe that paradoxical injunctions can stimulate creativity, which allows the widening of the restricted setting, and therefore leads to successful innovation.

*Hypothesis 2: Paradoxes in co-creation spaces can generate creativity and can therefore be a key to innovation success when they are anticipated, managed and overcome by facilitation.*

Loch, Galunic and Schneider (2006) claim that a balance between taking care of “me” (competition) and taking care of “we” (cooperation) is possible if emotions are accounted for (in Bengtsson et al. 2010: 28). But how can we combine cooperation and competition within the same relationship? How is it possible to be partners and competitive at the same time? Who can help the system to anticipate, manage and overcome these paradoxes?

## **Paradox management and facilitation**

According to Paananen, Irrmann and Smeds (2013), paradox management is a key to developing co-creation within open innovation networks. Although an increasing amount of research is being undertaken with regard to coopetition, very few studies have addressed the sources of paradoxical tensions and their management (Chen 2008; Gnyawali & Park 2009).

In the literature, two schools of research have emerged suggesting ways to manage paradox in coopetition systems. On the one hand, several authors propose the separate management of each of the two dimensions of the relationship: cooperation and competition (Bengtsson & Kock 2000). This can be linked to the Western philosophy that views paradox as two independent and opposing entities (Chen 2008). Beyond the simple avoidance of the conflict between cooperation and competition, which means having to choose between one dimension or the other, there is the question of their integration. A second school of research proposes the simultaneous management of each of the antagonistic tensions within paradox by internalizing the paradoxical injunction. The actors involved integrate both contradictory dimensions by counterbalancing competitive and cooperative aspects. Indeed, the strategic solution is to manage the tensions between cooperation and competition instead of choosing between these two forces. From this point of view, the objective is not to decrease these tensions but rather to maintain the balance between them (Fernandez et al. 2011: 2). This perspective invokes the Eastern or Chinese philosophy, which integrates the two opposing dimensions as interdependent entities.

As stated above, one of the main paradoxes of coopetition lies in the need to be both proximate and sufficiently distant. Therefore, firms involved in an innovation network need to develop skills of ambidexterity, that is, the ability to manage proximities (Paananen et al. 2013). Nevertheless, counterbalancing competitive aspects (distance) through the development of a cooperation mode (proximity) is not always easy in inter-organizational networks. Therefore, the project's actors would need to focus on cooperation rather than on competition. According to Lewis et al (2002), there is a need for specific management of coopetitive tensions, whether externalized or internalized, in order to maintain the correct balance between cooperation and competition (in Fernandez et al. 2011: 23). As Paananen et al (2013) state, the optimal structure for the network does not emerge automatically. Rather, there is a need for a project partner that is able to iteratively generate this structure and to provide support to the competitive partners within this dynamic of cooperation.



Although the actors in a project are essentially selected on the basis of their technical or management skills, non-technological or psychosocial skills are also crucial for inter-organizational innovation projects. According to Le Masson et al (2006), the area of innovation needs to go beyond project management. Indeed, human factors are significant for a project's success. Perret and Josserand (2003: 171) call for the need for "*an object or a person that allows the reconciliation of the two opposites*".

### ***Third party as a person: internal or external facilitation***

Paradoxical tensions can be managed through a third party, who holds the position of facilitator and coordinator between partners. This third-party position may be internalized within the project (e.g. the project leader) or may be externalized (e.g. a person external to the coopetition relationship).

Project leaders and managers involved in coopetition structures need to leave behind vertical management skills in order to adopt horizontal management skills (interpersonal and psychosocial competencies). Some research has focused on the development of a new role, that of "alliance managers" (Gueguen & Pellegrin-Boucher 2007). This role facilitates the coordination of apparently potentially contradictory interests, especially through the improvement of trust between competitive partners. However, Bengtsson and Kock (2000) highlight the risk of internalizing paradox at an individual level. In addition, managers are generally imbued with big management theories and mathematic methods. They therefore tend to approach human sciences in an inappropriate way, which we could define as an "accounting approach".

These remarks point to the positive effects of external actor with psychosocial skills. We have shown that paradoxes generate internal tensions in networks if they are not well managed. In her study, Rasulzada (2007) shows that psychological well-being is essential for creativity and innovation. This highlights the need to establish an appropriate organizational context in order to enhance radical creativity and innovation. However, most inter-organizational networks do not have the full competences, the know-how, the methods and the cultural logics to manage efficiently paradox and internal tensions. This highlights the need for support from specialists in both psychosocial profiling and people management skills.

Delhez (1999) distinguishes three main functions in group facilitation: production, regulation and facilitation. Compared to a project leader, an external mediator is able to focus on the form of the inter-organizational

relationship (regulation and facilitation) without being involved in the content (production). Indeed, the third party focuses on relational aspects within the group by proposing processes, methods and tools to allow efficient exchanges between partners. Through his/her neutral position in the relationship, an external person can bring another perspective to the project and give feedback. Therefore, he/she can help the system to identify and to communicate on paradoxes in a safe and reassuring way. However, what occurs in terms of content is inseparable from what is experienced at an emotional and relational level. Therefore, the facilitator has to make sure that these three key functions are brought together.

### ***Third party as media: tools, methods and processes***

According to Delhez (1999), facilitation is also expressed through various media. Indeed, paradoxical management tools must be integrated within innovation networks (Paananen et al. 2013). These media can take diverse forms: a flipchart or a white board, a prototype, a mock-up, the use of various methods, tools, processes, etc. Such media create a comprehensive and common vision of the project and promote the emergence of a group dynamic around a reality whose importance is accorded less credence than the project itself. The third party can also be a communication process instituted within the inter-organizational relationship. For example, Dejourns (in Chanlat, 1990) recalls that the Palo Alto Institute has shown the importance of instituting “meta-communication” areas in workspaces where employees are faced with paradoxical injunctions. These areas are spaces for collective dialogue, whose aim is to facilitate the discussion of points that usually go unsaid, such as people’s views on the system’s contradictions. Providing opportunities for collective dialogue is one of the best ways to promote radical creativity and innovation. Managing such meta-communication areas, however, involves a good knowledge of psychosocial aspects and the particular group dynamics.

As we have seen, the third party can take diverse forms: project leader, external person, tools, methods etc. Each third party follows distinct but compatible goals such as common understanding, group dynamics, knowledge transfer, etc.

### ***Hypothesis 3: Facilitation or “intermediation” can be made through a person (internal or external) and/or through media.***

In the remainder of this paper, we will illustrate the application of our three hypotheses with reference to the inter-organizational innovation projects that formed the basis of our field study.

## METHODOLOGY AND DATA

In a quest for competitiveness and redeployment, the Walloon Region (Belgium) has invested in the establishment of six Competitiveness Clusters. The government recognized that the emerging projects would be complex (requiring a high degree of innovation, and a minimum of four partners including two research centres and/or universities and two companies). They therefore decided to call upon the PSGO (Social, Group and Organizational Psychology Service) at the University of Liege to provide support to the clusters. Each competitiveness cluster has an operational team supporting its specific projects. In particular, the “Logistics in Wallonia” cluster stands out in its use of a psychosocial facilitator to support the project through the stimulation of creativity and innovation. PSGO has been studying and supporting these projects since 2007 within a paradigm of research-action. This paper stems from many years of research and support that have brought forward rich case studies with a high level of coopeition.

In order to be concise, we present here key findings from the research based on two portfolios of inter-organizational projects from two competitiveness clusters (I & II), with a focus on our key hypotheses. The first portfolio (I) brought together 19 partners and aimed to develop manufacturing processes of composite material for aeronautics. In the second portfolio (II), the inter-organizational project brought together 23 partners and aimed to develop surface-active coatings for better environment management. These project portfolios were examined on a longitudinal axis (during a period of between nine and eighteen months). Several complementary methodologies were implemented: examination of official documents, observation of meetings and significant events, semi-structured interviews and interventions with effective follow-up through feedback and practical advice.

## FINDINGS

### **H1: Coopetition generates paradoxical injunctions**

The daily situations faced by partners in all the inter-organizational projects studied were typical examples of paradoxical injunctions.

Six sources of paradox were found: multiple interests vs. a common strategic vision; adapted vs. adaptive organization; borrowed processes vs. newly-created processes; fragmentation vs. sharing; ignorance of others vs. trust in others; several identities vs. a shared identity.

1. MULTIPLE INTERESTS vs. A COMMON STRATEGIC VISION	The actors are torn between different levels of issues: community, organizational and individual. Defining a common strategic vision for the project and its ownership enables actors to make progress on these issues.
2. ADAPTED vs. ADAPTATIVE ORGANIZATION	This type of project requires the creation and the implementation of a specific organizational model, with adapted structures and operating rules. However, a process of innovation requires constant flexibility and adaptation towards the project by the organizations.
3. BORROWED vs. NEWLY-CREATED PROCESSES	Where each partner brings its own working methods and habits, collaborative work within the project is only possible with the development of a common methodology and continuous adaptation.
4. FRAGMENTATION vs. SHARING	Inter-organizational projects facilitate the transition from a situation of fragmentation to a sharing of information, knowledge and skills.
5. IGNORANCE OF OTHERS vs. TRUST IN OTHERS	In a partnership project, the actors generally know very little or nothing about the other partners, and this may present an obstacle to cooperation. Developing a trusting relationship is a key for the development of real teamwork.
6. SEVERAL IDENTITIES vs. A SHARED IDENTITY	Within a multicultural context, each actor carries both an organizational identity and his/her own identity. In order to foster collaboration and involvement, each partner also needs to gradually build a shared identity, including a common language development.

In inter-organizational projects I and II, the main risk was that the project would represent deadweight to the companies behind it. The companies in this position were able to seek financial support and a framework for outsourcing by drawing upon the rich expertise to be found, for example, in universities. In addition, organizations with a strong growth trend, who were leading a project, may have considered their partners as subcontractors, expecting them to behave independently and to act on their own initiative. The position of subcontractors leaves no room for the sharing of power. In this case, the companies were trying to impose a power-forced collaboration.

This example illustrates the paradoxes listed above and expresses, in particular, the paradoxical injunction of: *“We behave towards you as partners, but we continue to consider you as subcontractors”*. This confirms our first hypothesis that coopetition generates paradoxical injunctions.

**H2: Paradoxes in co-creation spaces can generate creativity and can therefore be a key to innovation success when they are anticipated, managed and overcome by facilitation.**

**H3: Facilitation or “intermediation” can be made through a person (internal or external) and/or through media.**

Hypotheses 2 and 3 can be analysed through a comparison of cases I & II.

In case I, the paradoxical injunction was exacerbated. Since the actions and the existing formal tools further increased the perception by the partners that they were being considered as subcontractors, the partners behaved as such: they waited for direction without taking the initiative. This produced a negative experience of collaboration and the failure of the project.

In case II, the organizational leader of the project was conscious of the added-value of facilitating the management of paradoxical injunctions. He asked for the support of a facilitator to advise the partnership on psychological and social aspects as a way to manage collaboration through practical actions. In this inter-organizational project, the actions of the third party were multiple: organization of meetings to share best practice; setting up of a mediation process in the case of conflict; support for monitoring and reporting; management of conduct during meetings; creative problem solving methods; building trusting relationship etc.

Furthermore, the creation of common and shared tools tailored to the project's needs was reported as one a best practice by the project's actors. A set of tools was developed consisting of templates, reporting procedures and IT collaborative management tools as well as training on their use. These tools required support for the partners to optimise their effects.

As a result of these actions, the partners were able to raise the level of innovation with regard to the product, but also in the way the project itself was carried out. Questions and doubts raised by paradoxical injunctions led the actors to question themselves. Such questioning, when collectively facilitated, led to an increase in the level of innovation and creativity. What could seem like an easy and economical solution in case I proved to be an obstacle to innovation and creativity. By contrast, the facilitation in terms of persons and media used in case II led to great results. This brief comparison shows the need to manage paradoxical injunctions through facilitation – via a person and/or media – in order to generate creativity and innovation, which confirms our second and third hypotheses.

Furthermore, these case studies show the added value of the support of an external third party within inter-organizational projects. Paradoxical injunctions can lead to anxiety, aggressive behaviour and sometimes mental disorder. However, an external third party allows actors to position themselves at either pole by opening up reflexion, leading to a renegotiation of the project rules. This third party is sometimes used as a buffer, allowing both the expression of the aggression by the actors and its containment. This allows the actors to liberate themselves from tensions and to avoid internalizing the paradox. Unlike the project leader, the external third party

does not have any stake within the project except its overall success (results and cooperation). Therefore, he/she is less susceptible to experiencing the negative effects of paradoxical injunctions.

## CONCLUSIONS

This paper has shown paradoxical injunctions as challenges that face actors within inter-organizational projects. Some people highlight the risks or the difficulties caused by such paradoxes. However, we see just as many opportunities to take advantage of paradoxes in order to generate creativity and innovation success. However, our research shows the importance of the third party in managing these paradoxical injunctions generated by this type of context, in order to ensure that actors are not left to experience the tensions involved. This paper sheds light on several research perspectives.

Firstly, different types of actors can help in overcoming the challenges of coopetition. Inter-organizational innovation projects bring together many actors with diverse functions: project leader, expert, researcher etc. Furthermore, this paper has highlighted the need both for technological skills and for psychosocial or “soft” skills (communication, conflict management, mediation, creativity, etc.). An initial research perspective could thus be the creation of a set of tools to help a project’s actors to anticipate these challenges. This would require a concomitant extension of the training of project leaders in relation to people management issues.

Secondly, a great deal of focus has been placed on external facilitators in this paper. Their role is to move the project’s boundaries by expanding the framework and therefore allowing the renegotiation of the rules in order to generate creativity and innovation. Unfortunately, acceptance of the involvement of an external party within a project is something our culture finds difficult. Further research is therefore needed in order to define both the position that a facilitator should adopt within the context of coopetition and the best way to make the role of the facilitator known.

Last but not least, the role of facilitation involves a personal commitment. Each intervention creates as many changes in the project as it does in the actors’ psyche. Individual personal change is as important as the change that takes place within the organization; the first provides us with information regarding the second. The facilitator can therefore use personal change as a tool but only if he/she is in possession of sufficient self-knowledge. In addition, we have noted that the external consultant can be used as a buffer for the anxiety, anger and fears of the project’s actors.

Therefore, we firmly believe in personal work as an essential resource for the psychosocial consultant, mediator or facilitator. This enables him/her to work on paradoxical injunctions while avoiding possible negative mental effects on a personal and group level. Paradoxical injunctions can thus be turned into a source of creativity and into a key to innovation success.

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# Let Me Do My Job – Industrial Designers' Experiences of Client Collaboration

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## ABSTRACT

*In the reported study, we explore the relationship of industrial designers and their clients in the co-design process from the designer's perspective. We look into the conceptual design phases, in which the most critical decisions concerning the product are made. Our primary interest was in how designers perceive decision making as a part of the design process. In our empirical work, we performed artifact-based interviews with seven practicing, professional designers based in Finland. Interpretative phenomenological analysis was used to analyze the transcribed interviews in order to reveal the central themes in designers' perception towards design decisions. The analysis surfaced four themes: the backdrop of the industrial design process, the fundamentals of designer identity, and the defense reactions and coping in response to identity threats. We found that while designers perceive the client relationship essential, it often seemed more destructive than constructive for their creative process. Overall, our study suggests, that by improving the communication and collaboration in the client-designer relationship, the innovativeness of industrial design commissions could be improved.*

## KEYWORDS

*Innovation process, Creative conflicts, Designer-client relations, Decision making, Social interaction, Conceptual design, Communication styles.*

## INTRODUCTION

This paper explores the designer's perspective on the collaboration of industrial designer and client in the context of outsourced industrial design work. The outcome of design is not solely dependent on the creative



abilities or expertise of the designer, but to a large extent on the collaboration between the designer and the client. Existing research suggests that the problems in creative industries in general rise from the conflicting values of art and business (Elsbach, 2009; Hackley & Kover, 2007; Holm, 2006). For example, Walker (1990) uses the metaphor of “two tribes at war” to describe the unsettled relationship between designers and managers stemming from differing goals, education and styles of thought. While these differing approaches or mindsets undoubtedly are the source of many conflicts, the reality is likely to be more complex, presumably even more so in the context of external design services. Although the relationship between the client and the designer has been identified as a crucial factor of success of design projects (cf. Eckert et al., 2010), it has been largely neglected in contemporary studies.

This study is explorative and qualitative and examines the experiences of industrial designers who collaborate with client to create new products or product concepts. Collaboration is seen as a mixture of diverse skills, temperaments, effort, and personalities aiming to realize a shared vision of something new and useful (Moran and John-Steiner, 2004). The goal of this study is to generate a rich view on designers’ experiences on this complex relationship. The data is comprised of semi-structured in-depth interviews with seven industrial designers working in four Finnish design agencies. This study approaches the subject from the perspective of interpretative phenomenological analysis (IPA; Smith, Larkin and Flowers, 2009). It focuses is on exploring how individuals engage in making sense of experiences and events, and what these experiences mean for the designers.

In this paper we present a preliminary analysis of the data. Our focus is in describing the problematic aspects of the co-design relationship as they are perceived by industrial designers. Even though the design cases we inspect as a part of the inquire reveal later success stories, we here highlight the demanding interpersonal relationship often emerging between the parties.

## METHODS

### Interviews

We conducted a qualitative interview study, aimed at understanding the world from an individual’s perspective (Kvale, 1996). The in-depth interviews were semi-structured. To make abstract language commonly used by domain experts tangible and help them to remember details of the story, the interviews were associated to designers’ reality through design artefacts picked from specific projects. Design artefacts have

communication functions, such as conscripting, coordinating, framing, persuading and recording (Hendry, 2004). In practice, some artefacts function as reminders, records of decisions (Whyte, Ewenstein, Hales and Tidd, 2007). These features embedded in design artefacts encourage using them as prompts in interviews (Ramduny-Ellis, Dix, Rayson, Onditi, Sommerville, and Ransom, 2005). Prior to interviews, two researchers assembled idea sketches and concept presentations produced by the designers for internal use and client presentations into a map (see Pic. 1). It presented the evolution of the design through different generative, review, and decision-making stages. Sketches were printed out in sufficient size and the material of the project was organized chronologically on large sheets of paper. This stimulus was used to structure the interview, as well as to establish a common understanding between the informant and the researchers. The material formed the outline of the interview and the interviewers guided and prompted the discussion by open questions such as *'Could you describe what happened next?', 'What did you think about that?', 'How did you feel about that?'* The objective was to discuss the events occurred during the project and the designers' feelings about them richly and in detail, with an emphasis on how the decisions regarding the design were made.



**Picture 1**  
**Illustrative example of a paper collage of a project timeline used as an artifact in the interviews**

### **Participants**

We interviewed seven industrial designers, who worked on four different projects in four Finnish design agencies. All participants were professionally trained industrial designers with several years of experience working from multiple clients. Except for one, all participants were male.

All interviews were performed in Finnish, the native language of the interviewees, the excerpts presented here are our translations.

## **Analysis**

The interviews were audio recorded and transcribed. Interviews were conducted and transcribed in Finnish, and thus the excerpts presented in this paper have been translated into English. In order to protect the privacy and ensure confidentiality of information on the interviewees, the agencies in which they work, and their clients, all possible references to other people, products, and fields of operations have been altered. However, careful attention has been paid to the relevancy of this information relative to this study. Therefore, some words have replaced with more general terms and these edited words and other remarks are put in brackets. The interviewees were given pseudonyms, which are consistently used throughout this paper.

We utilized interpretative phenomenological analysis (IPA; Smith, Larkin and Flowers, 2009) in the data analysis. Its focus is on exploring how individuals engage in making sense of experiences and events, and what are the meanings of these experiences. In the spirit of phenomenology, this study takes a data-driven approach to this issue as it aims to approach the data without any preconceptions and theoretical models. IPA acknowledges that people perceive the world in different ways and the method aims to discover and understand the experiences and events from the subject's perspective. IPA allows the researcher to explore, flexibly and in detail, the area of concern and to discover themes, recurring patterns of meaning that identify and convey things that matter to the informants.

Applying the steps suggested by Smith, Flowers and Larkin (2009, pp. 80 - 107) and Storey (2007, pp. 51 - 65), transcripts were printed out, read and re-read carefully to create the first notes. This initial noting concentrated on detecting the key concepts and important issues. These notes varied from semantics to posing questions, and making observations about designers emotions. After the initial phase, more abstract ('higher-order') themes were formed, but the aim was to remain close to the initial transcription so that the themes were rooted in the original transcription. Phase by phase new themes were formed and finally, shared themes across the interviews were identified through searching patterns, similarities, and tensions.

IPA approaches individual as a cognitive, linguistic, affective and physical being, acknowledging the connection between people's talk, their thinking, and emotional state. (Smith and Osborn, 2003.) IPA is as double-hermeneutic as the researcher strives to put oneself in the participant's place, to understand the participant's sense-making and then trying to

interpret, make sense of the participant's sense making (Smith and Osborne, 2003).

In the following, we will present our findings from IPA along with some discussion and references to relevant background literature.

## FINDINGS

The analysis revealed that designers' experiences were often characterized by dissatisfaction, frustration, defending, and contenting. We relate these negative experiences to foremost to the need of *maintaining professional identity*. Working with clients quite often appears to pose a threat to the designer's professional identity and identity threat and the struggle against the prevailing power structure reflect the designers' experiences. Clients may at times restrain designers from actualizing the *fundamental principles* of their profession, creating feelings of their expertise being undervalued and questioned. Threats to professional identity in turn result in identity maintenance behaviors. In the following, we consider these reactions under two broad themes: *defense reactions* and *coping*. We begin by describing the *backdrop of the industrial design process* as the designers see it and the *fundamentals of designer identity*.

### **Backdrop: Power Relations**

There is a shared, inherent consensus in designer-client -relationship about the power relation. The designer (or the design agency) receives a design assignment from a client. In the last resort, the client is the decision maker, although the designer assumes much responsibility for "small" decisions. In order to proceed in the project there has to be an approval from the client. The relationship does not include equal, the designer is always at a disadvantage, and the client has the final say in this relationship.

Despite the common understanding, designer accounts of the power relations aren't this simple; designer makes design proposals and the client decides, which ones to pursue. Designer consents to this relation, although, as it turns out, the consent is rather token. Designers challenge the client's dominant position and resist their disadvantaged position. There are signals that designers strive to attain and maintain autonomy by challenging the client. They consciously stretch the boundaries set by the client and the designer also has the control over his/her own work. Even after the client had made a decision to pursue certain idea or concept or certain idea had been rejected, there were some indications that these decisions or choices are not considered definitive and final by designers.

“although there, in the beginning the [idea] was rejected or it was considered that it is not that good of a feature, we still tried to offer it on the chance that it could nevertheless somehow be integrated into it“ (Dave)

## **Fundamentals of Designer Identity**

Professional identity is defined as a relatively stable and enduring constellation of attributes, beliefs, values, motives, and experiences in terms of which people define themselves in a professional role (Schein, 1978). Schwartz (1994, 21) has defined values as "*desirable transsituational goals, varying in importance, which serve as guiding principles in the life of a person or other social entity.*" The centrality of personal values for identity is shared by other scholars as well (e.g. Gecas 2000; Hitlin, 2003) and Rostan (1998) even claims that the identity of creative people is bound to their creative work.

Guiding principles of industrial designers' work are clearly emphasized in the data. These features and values (designer "ethics") form a significant part of designers' professional identity. The designers' aim is to create something that they consider *novel*, *distinctive*, and *coherent*. In addition to these attributions, the designers use such criteria as *appearance*, *usability*, and *functionality* in evaluating their work. The values surface explicitly when they are used as evaluation criteria for decision making and as goals for the design process. Designers strive for designs that are in accordance with one's own principles. These values form the ideal designer identity, striving for these values enables the designer to view oneself as good designer (Gecas, 2000). These values are reflected in the following excerpt of a design concept evaluation:

“they said that there had to be a [certain feature] in it, but then we, in our wisdom, started pondering if it could be replaced with something else, as that [idea/solution] is so much used and it doesn't look that good and [- -] it can also be difficult to use“ (Dave)

## **Defense reactions**

### ***Defending Territory***

Designers appear territorial. Designers are mainly willing to accept the constraints (such as timetable, budget, technical constraints etc.) set by the client, but they don't allow the client to invade the designer's territory and interfere the design activity itself. If this happens, designer may express even indignation. Territory includes designing related activity, such as sketching and prototyping and trespassing would mean presenting sketches or prototypes are nonnegotiable solutions or starting points for the

designers. In designer's perspective, client is only allowed to comment and give feedback, not to design.

Peter was indignant as the client sent him sketches, which the client himself had drawn with a ballpoint pen. This trespassed the designer's territory:

"Yeah, there's actually, that he has sent some scanned ballpoint pen sketches that I would like something like this, which have been more or less useless, but I got some pointers what that guy likes and which strings to try to pull that we can proceed in mutual understanding" (Peter)

Another designer experienced a similar situation:

"they kind of pulled out under the table a prototype they had done saying that we thought that it could be something like this, and then it was like, yeah, you have thought this too, way to go/great" (Dave)

### ***Defending Profession***

Industrial designers can appear as a relatively new profession, at least for disciplines crowded with engineers. Designers appear to wrestle with the legitimacy of their profession and appear to be underdogs. Peter brought forward explicitly that there is still some misunderstanding of what industrial designing is about.

"because for some reason, for crying out loud, this was started by designing it from inside out so that there wasn't much you could do about it -- I think that highlights really well how people have strange conceptions about designer's role, now, this went along the traditional pattern that the client expects the designer to jump in right at the end and he decorates the surface, that's just like what happened here, unfortunately, it ended up a bit of like surface decoration" (Peter)

On several occasions, designers felt that their whole expertise was questioned or they felt that the client didn't trust the designer's judgment. Designer often appears to be in a position, in which they have to continuously convince the client of their expertise. From the designers perspective, , a good client doesn't question the necessity of designing:

"well, the [client] has already quite a long history in terms of designing and you can see that everybody there thinks that designing and usability is an important quality in a product, it is supported and resources are put into it and there's no such things what some companies might still do that does this even need to be designed" (Steve)

### **Coping**

Under threat, people resort to coping strategies. Coping strategy can be defined as any activity that aims and succeeds to remove or ameliorate the threat to identity. (Breakwell, 1986.) Designers engage in coping strategies

on two levels; intra-psychic and interpersonal level. On intra-psychic level designers resort to (re)attributing. Attributions have three functions: making sense of the world and making the world predictable, preserving and enhancing self-esteem, and acceptance and avoiding confusion. (Hewstone, 1983). Attributions are understood as causes and reasons (Buss, 1978). People try to make sense of the outcomes, which follow from succeeding or failing to achieve their goals. We observed the use of *attribution* and *compliance* as intra-psychic methods, and *persuasion* as an interpersonal coping method.

### ***Persuasion***

If a decision to pursue a certain design idea has been made, but the designer is not satisfied with the decisions, designers can try social influence tactics to persuade the client. Commonly this happens through visual design artefacts and argumentation. Artefacts prompt conversations and steer the client's attention in the presentation of design options.

“Well, I think that this type of hand-sketched [image], that it is both on my and the client's opinion just an idea, a thought about the thing --- I thought that maybe it would help their decision making that they saw that you can make them similar although they are different concepts, when it comes to shape.” (Jenny)

Designers show persistence in offering ideas that may already have been rejected. Even after a clear decision not to pursue certain ideas or concepts, designer might try to change the client's mind. Sometimes this pays off:

“and, then, I think that we kind of managed to talk certain products into these final products, which hadn't necessarily ended up in the finalized concepts without our slight arm-twisting” (Tom)

### ***Attribution***

The points of decision making, meetings that were held to present the developed ideas and concepts were turning points. Often, when an idea or a whole concept, which the designer thought was full of potential, was rejected, designers strove to make sense of the client's decisions. Rejection was often attributed to the client's inability to read the sketch or to the sketch itself.

“But then I was irritated afterwards because I could have drawn that image in another way and sold it better, kind of. That idea would have been functional, for sure, but as it was presented this way that it looks temporary and that way that the structures are visible, maybe too visible or something, but so they got a feeling, no, we don't want this. But, then it was perhaps too late.” (Jenny)

### ***Compliance***

After all other strategies are have been explored, designer may resort to compliance. Compliance refers to acceptance, putting one's hands up and caving in to the client's power and transferring the responsibility

“so none of these was a kind of perfect solution and we kind of decided on that there is no perfect solution that there was always some type of restriction, which came along, and then it was actually the [client's] task to decide, which restriction was the least bad” (Steve)

“if this still doesn't feel right for them, then we'll go with that, and then that's their choice and so, at least I've offered [something else]” (Dave)

### **DISCUSSION**

Our analysis of seven designer interview protocols resulted in identifying the concept of *maintaining professional identity*. We argue that it reflect the experiences of designers well in their relationship to provide creativity by demand. This offers insights into the designer-client relationship, and helps to understand the experiences of designers.

Maintaining designer identity consists of carrying out certain guiding values in one's work and striving for autonomy and control. In a designer-client -relationship, every project appears to be a small-scale power struggle. In these struggles, designer tries to seek ways to influence, persuade the client, and when all means at disposal are used, designer has to fall in with the client's will and cope with. In situations in which the client's decisions led to dissatisfaction on the designer's part, intra-psychic and interpersonal coping strategies were used.

The client's dominating position may restrain the designer from actualizing the 'designer ideals'. Second, designer may sometimes feel undervalued and not taken seriously. Designers maintain their professional identity by engaging in identity management behavior. They try to influence the client by persuading through argumentation and visual representations. Industrial designer is a rather new profession in interdisciplinary product development and it currently holds a rickety position (Holm, 2006). The identity protection and management behaviors discovered in this study serve to protect and defend designers and their profession as a whole.

It was further argued that the collaboration and the dominating position of the client involve a threat to a desirable designer identity. Identity is reflected in the core values. External events that inhibit expressing these values, invading to designer's territory, or the sense of being undervalued



may pose threat to designer identity. Designers react to these types of threats to maintain their professional identity.

From the designer's perspective, the *lack of understanding and respecting the expertise of designers* as whole is the main source of trouble. The continuous struggle of not being listened to, being a bit of an underdog striving to do one's best. Hill and Johnson (2003) have suggested that in advertising, the client gets what he "deserves", meaning that as the client is the one posing constraints, making decisions, interfering with the creative process (of a copywriter), the resulting advertising is as good as the client allows it to be; posing time limits, evaluating creative products (these factors have been found to influence creativity. This finding seems to apply to design as well.

These experiences of designers do not give support to the common notion that the problems between designers and clients simply rise out of competing values or interests. The matter is more complicated. These interviews reflect rather the experience of questioning designer's professional skills, expertise; the designers defending their professional identity and the necessity of their expertise. Moran and John-Steiner (2004) note that psychological freedom and sense of control are crucial prerequisites for successful collaboration. However, the designers' experiences are characterized by different negative experiences. We have argued that client threats designer's professional identity, which in return diminishes the opportunity for constructive collaboration and co-creation in the design process.

Based on the different case descriptions, we observed three levels of co-creation: *coordination*, *collaboration*, and *co-design*. In *coordination* design agency has only design authority, client only steers the process. In *real collaboration* have more decision authority, provided by the client. However, in the best case, there is real mutual and *co-design* can take place, in which client also can take up design authority without threatening designers' identity.

## CONCLUSIONS AND FUTURE WORK

This study has strived for a better understanding of the designer-client relationship and the related issues. We have been very problem-focused, providing the opportunity to acknowledge and detect the possible points of conflict in advance and help to prepare for and overcome them. This might ultimately result in a more effective design process and satisfaction of both

parties – although it has been questioned whether the creative process can be triumphant if participants are on equal grounds, or are contract designers doomed for unhappiness (Lyon, 2012). Overall, our study gives a new perspective on client-ordered design projects and sheds new light on the relationship between professional designers and their clients, helping to develop tools for managing the early phases of co-design projects.

In future, we hope to see studies exploring the phenomenology of industrial design decisions also from the client side. Our in-depth study of designer insights could be greatly complemented by hearing the other side of the story. In order to *improve* the communications and collaboration between the client and the designer, information regarding the perspective of both parties is required. While it seems, that increasing the awareness of industrial designer's values and general goals among clients might improve the situation, it is not self-evident if that would suffice. Any intervention to improve the relationship should take into consideration the realities of both parties and likely requires both to change their practices.

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# "My Niece Likes the Colour Purple" - Knowledge Negotiations in Practical Packaging Development

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## ABSTRACT

*This article introduces an ongoing research process. The starting point of investigation was empirical observations that seem to recur: in practical packaging development there is certain moments when ostensible opinions and insignificant details can have a major effect to the developed outcome. Drawing on discussions about tacit, situated and practical knowledge the phenomenon is examined in packaging development on food sector. Research materials include 14 interviews conducted with packaging professionals. The materials are analyzed with case study approach. "Casing" of the research problem is built around two research tasks: (1.) how interviewed professionals framed potential situations mediating misunderstanding in practical packaging development, and (2.) what are detectable characteristics of these pitfalls in an on-going co-creative project. A tentative conceptual framework incorporating four themes is introduced in the last chapter. The themes constructed from the interviews are: 1.) meaning of design brief, 2.) co-creative mindset – "that cannot be done", 3.) irrelevant commenting, and 4.) role of research in packaging development.*

## **Keywords**

*Co-creation, Interviews, NPD, Packaging, Qualitative research.*

## 1 INTRODUCTION

An established food company is planning to introduce a new basic food product to the market. The basic product is familiar to all of the consumers, but the brand is new to the market. The brand owners start packaging development project for the new brand. A brief for the development project is broad. A professional packaging design consultant company is hired to realise the project. The completion of the designer led co-creative project is moving forward as planned. However, an opinion about a particular

packaging feature presented by one of the brand owners stop the development project at the eleventh hour. This particular opinion is backed up with a single but similar minded statement from a factory-floor worker. The development project slows down. The participants of the project are persuaded to accept the opinion. As a result, packaging redesigns and resource allocations are needed.

One of the authors, educated as designer, participated to a packaging development project in which the above mentioned incident took place. Based on practical experience, similar events seem to be quite typical in new product development (NPD). There seem to be certain “moments” not described or analysed in detail in the current literature. These are moments when irrelevant issues can have considerable influence to developers’ actions and expected outcome. The research task of this article is to explore how seemingly irrational issues or participants’ viewpoints can have a major influence on co-creative projects.

This article is organized in the following sections. First, a short literature review about tacit or non-propositional knowledge is offered. Secondly, research materials and methods are presented, followed by a section describing how the interviewed packaging professionals framed the phenomenon under scrutiny. Finally, a conceptual framework is presented.

## 2 TACIT KNOWLEDGE AND FORMAL INFORMATION

Academic discussions about different types of knowledge or information are as old as is the institution of science. In order to avoid lengthy, theoretical and abstract discussion about the nature of knowledge, it was chosen to discuss briefly about Michel Polanyi’s and Donald Schön’s concepts essential for the article.

NPD takes place typically in practical situations. According to Polanyi (1966[2009]) and Schön (1983), developers participating to these practices have both knowledge that resist verbalisation and they are not able or willing to reflect elements of their practice. Reflecting one’s work during an on-going development project is challenging. To construct a framework for knowledge usage in practical and experiential packaging development, concept of tacit knowledge introduced by Polanyi (1966[2009]) is usable. He identified personal know-how and practical skills as a form of knowledge which is hard to be defined or articulated. Professionalism in practical knowing is best communicated by using examples, not by abstract or verbalized rules (Polanyi, 1974[1958]). For example, general appreciation and prestige of master craftspeople is grounded to their non-

verbal knowing of specified area of craft in a way that others do not know (Sennett, 2008). This experientially constructed but not easily verbalised knowledge can be seen as a general human trait. Therefore, people having influence over a packaging development project - both paid professionals and laymen on the fringes of a project - have opinions and ideas they perceive as essential for development. Tacit knowledge is also actively created in a social and discursive sense (Mareis, 2012): co-creation is based on knowledge in practical situations which in turn is relative to developed packaging.

In the field of planning and design, Schön (1983) maintains that practical knowledge can be approached with the term of the reflective practitioner. Following Schön's concept, professionals reflect what they do and how they work in action and practical situations. Reflection is needed in special situations when it is not possible to act self-evidently (Giddens, 1993). In order to develop highly specialised skills, reflection of practice is needed. Essential for tacit, experiential, situated or personal knowledge seem to be that it is acquired and applied via practical actions, and that knowledge is person- and situation-oriented (Mareis, 2012).

Knowledge and information can be understood differently. In this article the concept of knowledge (or informal knowledge) is reserved for a personal dimension of packaging development (e.g. opinions, feelings, subjective interpretations, experiences, tacit knowledge). "Formal" information is used to describe justified – a common or shared dimension – of packaging development (e.g. researched, analytic, "objective", methodical, evidence-based, explicit). A demarcation line can be drawn between knowledge and knowing. The former refers to situation (static result) in which people know from the past. The latter refers to active processing of on-going situation (active perception).

Empirical examples told and reflected by the interviewed professionals are emphasised in this article. Description about practical situations and irrationalities of decision making are constructed in the context of packaging development. The goal of this article is not to explain intentions of development project participants described by the interviewed professionals, but to understand better meaning of practice and practical situations generating peculiar episodes.

Theory of practical reasoning (von Wright, 1971) suggests that in human action various interests always exist. Intentionality and goal orientation are typical for human action. However, reasons and motives to act can be subconscious. Actions can be goal orientated, but not calculated or reasoned. Co-creating, developing and designing are future-oriented action.

Or as Simon (1996[1969], 55) puts it: “Design is the transformation of existing conditions into preferred ones”. Situations highlighted by the interviewed professionals follow Simon’s definition: most participants of any packaging development project pursue better packaging solutions. Despite that shared and positive goal, processes and outcomes of packaging projects are not always as expected.

### 3 RESEARCH MATERIALS AND METHODS

The research method applied is an explorative or intrinsic case study (Ragin & Becker, 1992; Stake, 1995; Stake, 2000). The case is studied from the viewpoint of an interpretive and constructive paradigm. The case study method was chosen because the phenomenon under scrutiny is complex, contextual, and context sensitive (Yin, 2003). The research material was acquired through interviewing 14 professionals. Five representatives of higher education (E, education), five packaging researchers (R, research) and four company representatives (B, business) working closely to packaging development were interviewed. The interviews lasted from two to four hours, and they were recorded and transcribed in detail.

In analysis, attention was especially paid to themes that could be useful in describing the phenomenon and situations in which interviewed professionals had noticed unexpected reactions. These situations are typically followed by curious decisions and various justification rounds presented by their advocates. Excerpts describing these situations were collected together from several interviews. Excerpts describing similar events and action were then constructed as four themes presented in the next chapter.

The unit of analysis is unexpected or otherwise irrational moments in practical packaging development. These are identified from the interview materials. Analyzed case revolves around a theme of what kind of situations, actions and information is taken into account in the packaging professionals’ interviews. The casing of the article is built around an attempt to identify the phenomenon and to make it transparent in a way that it is easier to recognize in an on-going NPD project.

### 4 “NEGOTIATIONS” IN PACKAGING DEVELOPMENT

#### 4.1 A brief gone bad – starting point of a development project?

Starting point of majority of packaging development projects seem to be a crisis or problem situation in a customer organization. Typically a company

has lost its market share for a while and packaging designer is contacted for new and refreshing insight. Other cases are when changes in an existing product that needs to be communicated with packaging or when a product new to the market is to be introduced. It was stated in the interviews that companies do not contact packaging consultants when products sell as planned. Basic functions of a packaging are marketing or logistics needs (Prendergast & Pitt, 1996; Simms & Trott, 2010): a packaging is a marketing tool and it sells the product it embodies.

In addition, all of the cases or problem situations in practice are different. Starting of a packaging or NPD project is a situation where different viewpoints and intentions of participants are presented for the first time. “Negotiations” between different viewpoints start in these very first meetings:

“The interesting thing about our business is people are getting in contact with us when there’s a problem. No one comes in, no one rings and says: “Hi, our packaging is doing wonderfully. We’re really happy. We want you to do some wonderful work.” It’s more like: “We’re in trouble. (...) Or maybe they just say: “We would like to do a little packaging. (...) There’s never a typical product. That’s the thing. There are no two projects the same. So people call you with a problem and usually that problem has a problem that (..) you’ve never seen this problem before.” (B9)

Interviewed professionals brought frequently up meaning of a design brief in the beginning of a project. A design brief or a task given to a designer was seen as a potential source of misunderstandings. One of the interviewed professional stated that: “*No client has ever given a decent brief in all my 18 years, so.*” (B9). There are several reasons why briefs are challenging. Customers cannot typically verbalize what they actually want or expect. However, they expect changes to be made and something new from a designer. Customers have also a vision about new designs but possibility that views of a designer and a customer meet at the tacit level is shaky. In addition, development has always unpredictable creative turns that cannot be written into a brief in advance:

“I think that the problem is (...) in a sense, it is company-led brief. (...) Design briefs have major effect on what you can and are basically allowed to do. I will critically generalize, but typically they [customer company’s representatives] have not had time or bothered to think about what should be done in designing. Then a designer has tremendous task to process a fuzzy general brief into something that is maybe sought after by a client company. Well, I guess it is part of our expertise to stitch up a design task. Another thing is that they just take an existing technical solution (..) You can imagine a brief when all of the technical specs are fixed, spots for logos determined in advance and so on. No leeway at all.



(...) It should be studied and discussed how you give a proper brief for a creative activity.” (E4)

”Customer companies buying packaging design cannot tell what they want. So, you have to guess something that will probably lead to right direction. You just try to come up with designs that the company can probably use in their business.” (B7)

Designer’s ability to simplify and concretize the need for a client company is emphasized. These situations are filled with subjective opinions, viewpoints and knowledge quite challenging to be communicated to other participants of a project. Another question is that should a customer buying packaging design know in advance what do they want? Is it even possible? Although these issues often escape verbalization, communication about a fuzzy front end of packaging design could be beneficial for participating organizations:

”I think one of the hardest things for us is to basically calm clients down and say: ”Look, this is supposed to be fuzzy. You’re supposed to not know what you want.” (B9)

”I must say that it depends on how good luck a company has with a designer. Maybe there is this communication issue from company’s side. (..) Designer should be able to concretize, at least moderately, company’s goals. (..) A good designer can see situation in SMEs’ straight away. (..) I have seen that a good designer can help a company even if company representatives have no idea where they are going or what it is that they really want. One of the most important characteristics of a designer (..) or at least they can succeed better if they can analyze their customers in detail (..) that they can see the strategic situation of a company better than an average developer.” (R6)

Surprising and peculiar changes in design brief was briefly mentioned in the interviews. These kinds of comments refer to situations in which participants of a project have had differing visions about a design. Changes in briefs originate from a client becoming aware of current direction of a development project. If a brief is changed, then a direction was erroneous from the client’s point of view.

#### **4.2 From co-creative briefs to realisation of design: “that cannot be done”**

”A new packaging project starts typically by getting to know with the client’s packaging line. And then, of course, an engineer comes and says that our design is impossible to realize. We never swallow that, but ask instead: ’why not’ and ’how can we make this work’. That is how it goes.” (B5)

Most of the interviewed professionals mentioned that they have encountered “mysterious” resistance during packaging design projects. By mysterious we mean arguments or justifications presented by client

organization that seem not to be rational in a given context. Resistance coming from a client's side is crystallized in a blunt remark focused on new packaging design: "It cannot be done". In a typical situation engineers have informal knowledge about their packaging machines, and they cannot see how a newly designed package could be manufactured with existing equipment. Designers typically apply visual persuasion and concrete examples. Other participants of a co-creative project are persuaded by showing how a design can be realised:

"I have noticed an interesting phenomenon among designers'. Or at least many colleagues of mine have pointed out that when a designer puts forward a new and potential packaging, other professionals always state that it is too expensive or it is impossible to realize. Then I just want to show that the design can be carried out (..) to demonstrate that it works. I was interested in packaging machines because I encountered numerous times the same answer: "Nice, but we do not have a machine to do that". I actually started to design manual methods and simple manual machinery: "Yes. But check this out. This is way a machine could produce new packaging." (E4)

There are also differences in working styles between professional groups'. Graphical designer, structural designer and material design realized by an engineer will probably all have different viewpoints to a same packaging. They also use both researched formal information as well as tacit knowledge cumulated in practice to justify their viewpoints. It was brought up in the interviews that as many participants should be involved with a development project as possible. These groups include - in addition to already mentioned - decision makers, internal power blocks, and especially marketing people because they have the power to say "no" last in the packaging value creation chain.

Designer's ability to compromise was also mentioned. Designers need knowledge on how to persuade other participants of a client organisation to work with designer, not against him or her:

"I think sometimes there are opportunities in those compromises. Sometimes you get to a point and everyone's happy and you're moving forward. And then the engineer sticks his foot in and says: "That can't be done." And then we all say: "It can be done. We just got to work hard." And we got to just push the boundaries and have compromises. They might be technical, they might be information, or graphic kind of solution that's needed. But sometimes in those you find innovation. (...) One of our clients was so overjoyed about a design idea that he fought with the manufacturing to make sure that he gets all of those he wanted (...) They [packaging manufacturer] said: "We can't do it." And he says: "I want it." (B9)

First project is always the hardest. It was stated that following projects flow more easily and more creative solutions are allowed (B9). It was noticed that hard work needs to be done before knowledge is openly shared and consensus is reached. Compromises are needed in order to advance a project. In the interviews there was pondering for reasons why “cannot be done” way of reacting exist. From the research point of view it was perceived as interesting to analyse “real” motives behind cannot be done - discourse. An example from the interview material:

“It would be nice to analyze brand owners talk and try to reveal meanings embedded in that talk. I mean to analyze what they mean when they say: ‘A new packaging design would need totally different packaging machinery and incredible investments’. To analyze how they reach a conclusion: ‘We cannot afford to do that’ (..) Sometimes I feel that it is just an easy exit and swift ending of an awkward topic. It is a knockout: ‘this is something we will not even discuss’. Although, a new design could be done with a fairly little input” (R10)

#### **4.3 Metamorphosis of a layman - commenting as a professional**

When sketches or examples of designs are produced, starts discussions about direction a project should take. In this context, mismatch between justified professional knowledge and layman’s subjective opinions was a theme brought up frequently by the interviewed professionals, especially the designers. We call these situations in practical packaging design as “commenting”. By commenting we mean special situations in which laymen or participants of packaging development possessing no professional knowledge or formal information state their opinions. There are logical and self-evident explanations why commenting occurs, but with the excerpts presented next we wish to show how disparity between different types of knowledge is manifested in practical packaging development:

“When a packaging is designed and ready (..) Then opinions start to flow, and demands for small changes are presented. In the end, we have 20 rounds of commenting and redesigning. Every now and then opinion is asked from CEO’s wife - what she thinks about new packaging – and then another opinion is inquired from a nephew.” (E1)

“I have noticed that there is an attitude towards packaging design. It is still seen as something secondary a nephew can do in his free time. Developing and designing exact packaging communications, materials, physical shape and other relevant packaging elements is not perceived as important especially by representatives of SMEs’. It is peculiar, because more than often packaging is the only way for a small company to do marketing. (...) Why packaging design is perceived as an easy job to do for a client? (...) And it is not only packaging but we are talking about all kinds of design, as well. It is somehow too easy, you just press button of your computer and that is it.” (B8)

It is typical for a customer to focus on details of designed packaging. Changing details of a design may seem a little task, but while commenting customers do not perceive packaging as it will appear after a change is made. They do not realize how proposed changes will appear together with existing packaging elements and changes made earlier. As interviewed designers see it, packaging design appears for some reason as an easy task for majority of client companies. An attitude towards packaging seems to be that everybody can design it professionally and comment it freely. The commenting was put to a form of “nephew-” or “niece-syndrome”:

“The best one was: “My niece likes the colour purple.” And my answer was: “I will be really honest with you. I do not give a (..) what your niece likes and I do not care what you like and I do not care what I like. What matters is: is it going to sell? And this colour is irrelevant.” Yeah, we have heard really stupid things.” (B9)

Essential function of a packaging is to sell the product. Decision making during development stages of a new packaging should support this mission. However, there are occasions when an opinion from an outsider can rule out a result of a major consumer or user research (B8). Missing ownership of a packaging development project makes it also possible for irrelevant commenting. This means that a person heavily involved is not likely to engage “commenting” because of commitment and knowledge about current state of a project. One of the interviewed designers raised also a question about designer’s credibility, which leads to “negotiations” about knowledge. Another designer raised a question about taste: in other words, laymen’s and professionals’ ability to evaluate aesthetic characteristics of a designed packaging. There are people with good taste and aesthetic eye without formal design education and another way around:

“And what comes to an evaluation of design outcome (..) A client can be as discerning as a professional designer. It is totally possible. But when we have these situations, are we actually talking about credibility of a designer?” (B5)

“There are people with good aesthetic taste without artistic education, or they are just interested in material, aesthetic and structural issues. And other way around, there is professional and educated designers whose aesthetic eye and taste are not that developed” (B8)

Commenting as negative act refers to insufficient knowledge of a non-professional. At the same time, a situation can be other way around as indicated above. However, customers and clients have power over outsourced packaging design consultants. As presented, negative commenting can lead to several commentary rounds in which opinions of one or few non-professionals can be over-emphasized. Based on the

interviews, brand owners typically comment if a design is not what was expected, if they want certain kind of packaging or a copy of existing package (but did not told in advance, had fixed mind-set) or if they long for a general shape already in use in a product category (B5; B8; B9; E4). Commenting take place also if brand owners want subconsciously stay with their old packaging design although a need for change is recognized.

The interviewed professionals mentioned that there are cases in which brand owners just want to hire a draftsman to realise a fuzzy idea that does not exist yet. Situation is that a change in packaging is needed, but a problem is how people involved perceive a change:

”We do not want that kind of change’ they say [representatives of a food company]. But it was a change they were after (..) it is mysterious. This is designer’s dilemma regardless of the sector you are designing. Change and innovations are demanded, but not executed in a same extent. This is not an exceptional company case. But what is interesting is that this kind of phenomenon exists in the first place. (..) But then the courage to realise new designs is missing. (...) I think that the current company I am working with just wants to have ordinarily shaped carton. And [a company name] wanted that copy of [a company name] packaging. And [names of company representatives] wanted to keep subconsciously their old packaging. When a designer has something new and tries to create distinctive packaging (..) then a project starts to roll to the wrong tracks. Why companies want to hire packaging designer if they just want to have a draftsman to sketch already decided form to their old packaging?” (B8)

Interview materials revealed that commenting is less present in packaging projects in which different roles of participants are understood, accepted and respected. It was pointed out that if designers have practical evidence and company cases about successful projects with industry, knowledge and know-how of a designer is not that questioned.

#### **4.4 Packaging research – formal information and non-talk**

Commenting about new designs and different knowledge in packaging value chain seem to be linked to different viewpoints and communication issues between participants of a project. Increased packaging research was mentioned in a different light. Research was perceived as providing formal information to otherwise quite fuzzy processes. However, planning, realising or evaluating of research was mentioned as secondary compared to easily usable or applicable research results. Results backing up practical development work were seen as beneficial and well justified.

Many themes about research surfaced during the interviews. Three themes are highlighted in this article: types of research beneficial for packaging

development, role of consumer and user research and weaknesses in applying research results. One interviewed professional pointed out that especially company led packaging research should be quick and cheap. Research results should be practical and applicable in a fast pace:

"Companies would like to have (...) maybe methodically fast and relatively affordable research combinations. Research setting where they could test new packaging and learn from experiences. Packaging testing is typically conducted by personnel of a company. They take developed packaging home and ask: 'do you like this?'. 'Oh, yes. It is quite nice'. They are deeply involved in a development process so this kind of testing is quite fruitless (...)" (R7)

However, it was stated that companies want typically to play safe with packaging development. This means that sometimes research is conducted only in order to avoid or postpone decisions that appear in uncertain business environment. Another issue that came up in the interviews is that in some situations research results are not believed in by representatives of a client organisation. In these cases much work is put in research and development activities, but brand owners do not take advantage of results:

"Research could open up how a co-creation progresses and what are issues taken into account (...) Research could encourage companies to do brave openings to the market. It is not always necessary to play safe. You can always fix, edit and adjust packaging later. (...) Then another thing linked to design (...) and to over-analysing on the whole, is a kind of creative aspect that characterizes packaging development (...) It can be lost in making only rational analyses" (R6)

Research is also conducted to support design or to justify already made decisions. It appears to be a problem for a company to accept that current packaging is not appealing and it needs to be improved (e.g. defensiveness, defensive explaining). Packaging research as idea testing is challenging also in terms of information provided: what should be done in a situation when research results support contradictory conclusions?

Above mentioned question about reliability or interpretation of research results was brought up in the context of consumer and user research. How much it is possible to trust what the consumer says? It is stated that real situations and authentic observation circumstances can provide better research results when consumers' packaging relationships are considered:

"You just cannot ask the consumer: 'how do you use this?' or 'do you have difficulties with this packaging?'. The user cannot answer these questions. But you should go and sneak into everyday life of the consumer and observe authentic usage situations. Knowledge provided by observing could be useful for a designer's work. Much of so called scientific research is not." (E4)

"Consumers' talk is about that they want easy to open, ecological, recyclable and easy to dispose packaging. These are the variables that constantly came up in focus groups. Surface of these conversations are kind of non-talk with no contribution. You will get these same results all over again (...) Well, another thing is that how much you can generally believe in what people are talking about anyway. (...) I would personally trust more if I could see the consumer in an environment as genuine as possible while they live their everyday lives." (R10)

The consumer can only comment packaging from a certain points of view. This raises a question about application area of consumer research in creative packaging development and design. Based on the interview materials, it seems that formal information provided by research is easier to be rejected than informal knowledge possessed by a participant of packaging development team member or an opinion of an external commentator. Sometimes an opinion of a nephew is "more convincing" than results of a justified consumer research.

## 5 DISCUSSION

An idea for this article originated from empiric observations during several practical packaging development projects. From time to time, quite peculiar occurrences and statements had major effect to an outcome of a development project. Based on 14 interviews with packaging professionals, four themes and a framework describing potential situations mediating irrationalities were constructed.

Firstly, meaning of design brief was seen as an important especially in beginning of any development project. Much of divergent viewpoints discovered later in a project can be traced to beginning of a project. Secondly, "a co-creative credo" was identified. "That cannot be done" was stated as being typical answer when new designs were introduced. Fixed viewpoints are brought up when new designs are introduced. Thirdly, a theme of inappropriate commenting or "metamorphosis of a layman into a professional" was constructed. Ignorance is revealed in situations, when comments based on knowledge out of the context are presented. However, importance of diverging viewpoints in packaging value chain was highlighted in this context. Fourthly, packaging research was perceived as increasing activity, but its role as a producer of "non-talk" and its function as backing up fixed ideas were questioned.

Following Schön's (1995) theory of knowing-in-action, all of the themes brought up by the interviewed professionals enter into the idea of "packaging development knowledge". These ideas originate from practical packaging development, but they are not knowledge as such. We treated the

discussed themes as knowledge within the context and the typical arrangements of a company-led NPD. The constructed four situations reduce effectiveness of decision making in practical packaging design when confronted. When the mentioned situations are identified, mutual understanding is easier to reach between participants with different backgrounds and knowledge-bases.

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## Theme 4

Spaces, Methods and Tools for Co-Design and Co-Creation



# The Role of Objects in the Constitution of Collaborative Spaces

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## ABSTRACT

*This paper examines collaborative processes involving users and product development practitioners, in virtual co-creative spaces. Qualifications of roles are entailed in and through the mediation of objects, as they serve part and parcel of the coming-into-being of the collaboration. By focusing on the role played by objects in collaborative spaces, more specifically an Internet-based forum established by a medical device manufacturer for users of its products, the paper makes a threefold argument concerning the active role played by objects in collaborative processes: 1) the premises for user involvement in such spaces is subject to behind-the-scenes qualification processes directed at particular user configurations; 2) virtual spaces are being re-configured by users' and practitioners' interactions through diverse references of objects; and 3) users and practitioners qualify the content of these spaces by negotiating the meaning of the objects that both engage. Thus, such collaborative processes bear with them potential trade-offs and inherent tensions by way of boundary drawings and reordering of roles, articulated through qualification.*

## KEYWORDS

*Collaborative Spaces, User Involvement, Re-configuration, Boundary Objects, Qualification*

## INTRODUCTION

This paper aims to highlight the role that objects play in virtual collaborative spaces of co-creation by empirically engaging a recent user involvement initiative undertaken by a medical device manufacturer (Presented in this paper under the pseudonym: CP.co). CP.co has been engaging users in its product development processes by adopting traditional methods of user involvement. Most recently CP.co has expanded

the scope of its methods by developing an Internet-based platform. Here the company's practitioners and users meet each other in virtual space, in order to explore and co-create concepts of new and improved products in colostomy and continence support (the company's speciality) while dealing with everyday challenges imposed on users owing to their medical conditions. The Internet-based platform, explicated by CP.co as a new user involvement method, is a site where practitioners can be seen to collaborate with users of the company's products. Such collaboration involves the mediation of objects albeit in a virtual forum. Through empirically drawn insights offered by CP.co's practitioners and the resources of the forum, the paper addresses the premises for co-creation processes and how these are negotiated and potentially (dis)qualified in virtual collaborative spaces by practitioners as well as users. The paper takes as a starting point for such empirical examination objects that users and practitioners engage within the Internet-based platform and explores how these play a role in the (re)configuration of collaborative spaces, and the qualification of users and practitioners. A synthesis based on the conceptualizations of objects drawing on the notion of Boundary Objects and related works, foregrounds the role of objects as transformative elements of collaboration, rather than simply effects of co-creative activities.

## THEORETICAL BACKGROUND

The theoretical basis of the study lies in Actor-Network Theory (ANT), where it also draws, more broadly, upon theoretical concepts concerning notions of the object aimed at shedding light on its constitutive role in collaborative practices. The latter, whether in the form of Boundary Objects (Star and Griesemer 1989), or related concepts which take Boundary Objects as their starting point – e.g. Intermediary Objects (Boujut and Blanco 2003) and Epistemic Objects (Ewenstein and Whyte 2009) etc. - serves to frame the heterogeneous and mediated character of collaborative practices. Yet, ANT allows for nonhuman action to play more explicitly into the analysis and in the framing of collaborative practices, as part and parcel of hybrid collectives, with implications for participatory engagements and notions of agency herein (Callon 2004). In so doing, the theoretical stance allows for an empirical treatment which may scope possible dynamics and orderings of collaborative practices as they come-into-being and are transformed, in terms of roles, human and nonhuman, without taking roles and their attributions as *a priori* givens. The ability to discern and hence attribute agency to nonhumans opens up possibilities to dig into collaborative practices. In that sense the notion of qualification (Callon

2005) becomes an analytical device for exploring more thoroughly the role that objects play in the conceptualization of and the trade-offs in professional and user practices, and in-between. Moreover, the paper engages qualification specifically in terms of the unfolding processes of designing and innovating in collaborative practices. Here objects play a part as material re-presentations of the evolving object of design supporting communication and participation in the creative process of making (Björgvinsson et al. 2012).

## METHODOLOGY AND DATA

The study is based on a qualitative approach to inquiry and the generation of empirical material for analysis. While the Internet as a field site in qualitative studies is far from new, a focus on user forums as an empirical site is gaining interest, for examining and understanding user innovation activities (see, e.g. Hyysalo et al. 2013). The present study has engaged ethnographic methods to treat the Internet forum as both a cultural and technological artifact (Hine 2000). While the generation and treatment of empirical material has been limited to areas of engagements by users and design practitioners in a “virtual world environment,” internet as culture and artifact has shaped sensitivities to our inquiry, toward a “responsive methodology, sensitive to emergent phenomena and emergent research questions” (Boellstorff et al. 2013;). More specifically, the approach has been twofold, entailing: 1) an examination of a delimited set of postings on a relatively recent company-initiated Internet forum dedicated to user innovators; and 2) a delimited set of semi-structured interviews of design practitioners affiliated with the company in question.

## FINDINGS

### **Qualifying collaboration through user involvement methods**

The company, CP.co, explicates in its mission statement the importance of users for product development, insofar as users help create value to the company’s product development processes. A common characteristic for the broad range of methods in user involvement developed by the company is that they invoke different spaces (be it physical or virtual). These mediate interactions between users and CP.co’s practitioners (e.g. one such space being a special toilet facility equipped with devices for monitoring consenting participants of use studies, as they interact with devices and situations under study). Different users give insight into everyday activities

for demonstrating to CP.co's practitioners how they use current and forthcoming products within continence and colostomy support. In such ways CP.co aims to create knowledge regarding the different and potentially unexpected ways that users (inter)act with new products and materials. While firms such as CP.co and also popular management literature engage the notion of "users" for demonstrating creativity entailed in a variety of user involvement methods, they are much less concerned with reflecting upon "behind-the-scenes" processes that feed off those methods with "appropriate" users. The number of CP.co's users with their colostomy support products may count in the thousands – this being the case, what, then, qualifies a user to be relevant for collaboration? What is the relationship between *the configuration of the user* (Woolgar 1991) and that of the collaborative spaces that she/he comes to inhabit during user involvement processes at CP.co? We explore these issues by examining a recent undertaking by CP.co, initiated to harness user inspired innovation - the Internet-based communication platform User Innovative Network (a pseudonym, henceforth referred to as "UIN").

### **Configuration issues in *virtual* collaborative spaces**

The network UIN nurtures forums and sub-forums where users (and CP.co practitioners), as members, can discuss everyday life issues related with colostomy and continence support. Other members, such as non-users of the company' products, may also engage at this site as it is not exclusive. Users are expected to contribute to UIN's content by qualifying product understandings and sharing opinions about product improvements through postings, or even offering new concepts by the uploading of sketches onto the site. Through this site, a virtual space for the development of collaborative relations and interactions has been envisioned by the company, as is also explicated in the company statement on UIN. More concretely, the company practitioners post specific 'challenges' onto the site. While based on the company product portfolio, the challenges are aimed at cultivating innovations, by setting the stage for dialogue and negotiation among users of colostomy and continence products and the company's product development practitioners (e.g. user experts). The virtual setting of the UIN platform and the members' forum may, at first glance, be construed as an obvious venue where collaborative processes of interaction is enabled, in-between users and with company practitioners. While this indeed could be the case, UIN comprises, moreover, of a set of *ordering devices* (Suchman 2007), through which the very collaboration at play has been qualified. Contributions to the collaborative engagement through comments (texts), uploaded images, etc., allow for user

involvement, albeit, in a rather *configured* form of interactivity, i.e. without the risk of disturbing the UIN's very infrastructural ordering of the collaborative space. How then, may an array of materials specifically intended in the UIN space to equip users to *innovate with*, be construed, with regard to users' engagement and means with which to contribute to this virtual collaborative space? This will be taken up in what follows.

### **The Innovation Box case**

We complicate through the next instantiation, the treatment of the heretofore UIN space of collaboration, by introducing one of the specific challenges on the UIN, namely the case of the Innovation Box. The IB as a "toolkit" comprises of an array of materials intended to equip users to innovate with. Through a four-part examination of the UIN space, we examine how IB figures into user involvement in UIN with a focus on the co-constructed and negotiated collaborative relationship of members mediated in and through the UIN.

#### ***Part 1. Making users interested***

A CP.co's employee posted the following comment and picture (Figure 1), in order to open up the innovation challenge of IB for comments and inputs from UIN users. The posting reads:

"[Below there] is a photo of one of our old toolkits. It was sent to selected members so they could make mock ups of their ideas...It contained different foils, non wovens, adhesive flanges, couplings, velcro, outlets, filters, couplings, scalpel and a small hand welder. We are soon to make new toolkits. We can make more or less copies of the old ones, but if anyone has improvement suggestions we will be glad to hear about it."

CP.co's presentation of the IB may be construed as an *interesement device* (Callon 1986) provided by CP.co's employees to UIN's users. The IB's visual (an array of materials) and virtual re-presentation (Figure 1) is offered to the users as an object capable to generate specific collaborative content. In that way users are invited to interact with and re-constitute IB's content by virtually engaging with some of its materials through a visual representation. In this way it is taken up and problematized to interest, and mediate discursively as well as materially through the UIN virtual platform. In that sense the IB seems to enroll and configure users only through some delimited instantiations by CP.co's employees.

But is this the case?





**Figure 1. The "old" IB, a toolkit containing an array of materials presumably for materializing new ideas.**

## ***Part 2. Configuring users and practitioners***

As the IB seeks for suggestions for its improvement it is worth to follow some cross-talks in-between UIN's users and practitioners and explore whether IB is perceived as initially intended:

[User 1]: "I think that it would be a good idea to include two Kevlar sheets in any future toolkit."

[CP.co practitioner]: "...we will include more or larger pieces in next version. In the mean time I will find a sheet in our lab and sent it to you, so you can continue your great innovation work."

[User 2]: "Being a clumsy and impractical person, I think I would need two things: 1. For each item a description what it is and what it could be used for. 2. Some guidance or instructions for use on the welder and probably some other things as well. "

[CP.co practitioner]: "We can include a list of the different materials/components and a description of what they are and how they can be used."

[User 2]: Thanks...that will be very helpful. The video could be posted in UIN or on Youtube?

As soon as different users respond to IB's virtual representation, it seems the initial attempt, for making users interested to only some of its particular forms (e.g. materials), is challenged. The IB now turns from an *interessement device* with the immediate intentions of CP.co set earlier by the CP.co's practitioner, into something else. It is still flexible enough to engage users, while allowing users to relate to it, in a manner which is also specifically meaningful to them. This makes it a Boundary Object (Star and Griesemer 1989). Users and practitioners now engage IB's material

properties but also negotiate upon processes, such as descriptions and instructions, that constitute a virtual but also a "traditional" co-creative space. Once IB's role is exposed to users its meaning no longer resembles a single material instantiation, but rather a socio-material space in which the user and the practitioner become configured as co-creators by revealing and transacting upon IB's multiple role. Moreover, the IB's different translations do not only describe its immediate context (improving IB within UIN) and configure actors, but also reveal that the terms of collaboration may involve issues of planning, organizing and learning, that traditionally seemed to be identified by CP.co and not by the users, as such. There seems to be an inherent paradox in members' consenting to the IB being presented (by CP.co), while its particular representation is being challenged by the same.

### ***Part 3. Qualification and trade-offs***

IB's introduction into the UIN and how users respond to this initiative, within the forum, brings to the fore, the relationship between the company practitioners (e.g. the user experts) and the insight and expertise brought into play by user members. The seeming discrepancy between the company's move to *enable* users to innovate *with* IB, and some users' redefining of its meaning *to them*, points to issues that may be potentially at stake, in terms of co-creation, i.e. from the vantage point of *who*, *and in* what capacity, enters into a collaborative process. In the dialogue showcased in the previous section (part 2), both users and practitioners seem to be configured unproblematically, even though the company goes *beyond* the boundaries of its traditional 'in-house' engagement of users, through YouTube and the shipping of extra materials. Yet, tensions regarding users' acceptance of their configuration become apparent, as soon as well-established elements of professional practices, such as fixed specifications and professional assumptions (even for user experts) about the users and their potential roles in the collaboration, come to be challenged through the users' contributions. A company practitioner, who spends some of her time, as part of her professional work, reviewing the content of UIN, mentions the following:

"...once you start to communicate with the end users they also expect answers. Then you have to sit there all the time. I tried that for 2 months just to sit there and communicate with them and I think part of it was learning process for both ways. Because I needed to teach them [the users] about general things which they did not know and then I got more information back, so the more information I gave them, the more information [the users] were able to give me back. It took a while to put them on a level that they could provide me with very qualified

information which I could use. Because [usually] 99% of what I get I already know.”

The *qualification* of user insights brought about in the virtual space of UIN, intertwines with issues of practice, as these challenge current framings of learning, collaborating and working arrangements found in traditional organizational spaces. Thus, users’ relevance for co-creation processes, in and through collaboration, seems to depend on configuration terms, mainly defined by the company. But as users seem to hold also the role of collaborators at the early phases of product development, then they may also be conceptualized as *skilled practioners* (Kilbourn 2012): They are both experts in dealing with their diseases but they are also recognized creative assets in product development owing to their skills. As such, users’ skills are likely to entail creative elements relevant for pre-defined spaces, actors and problems in co-creation. Yet, such creativity may as well be an asset for the design and staging of the processes “behind-the-scenes” to the foregrounded co-creation, that enable users’ insights and issues to prevail in different organisational settings within the company.

An occasion for demonstrating how users’ creativity deviates from – and challenges – CP.co’s professional frames of qualification, is reflected in the following comment and photo (Figure 2) that another user, “the inventor”, posted under the IB challenge:

“I have made several ostomy night collection systems since I have not found any on the market. My output is high volume liquid with chunks of whole food. I was not able to sleep / rest more than an hour without getting up to empty my pouch. I attached hose, originally respiratory hose and now washing machine drain hose, to a two piece pouch and run that into a pickle jar. I would like to find a more flexible 1" hose and a better way to attach it to the wafer. Is anybody working on anything like this? See attached picture [referring to figure 2].”

As the inventor found relevant this particular post for presenting his invention he challenges the seemingly stable configured space of the IB challenge, with the visual representation of IB illustrated previously (in part 2). This user does so, by enrolling new references, that while still resembling particular problems of everyday practice, are not practicable in the previous mutually configured (i.e. co-configured) space of IB. This invokes different collective (dis)engagements and interactions in a newly constituted collaborative space through the inventor’s introduction of new references. This issue will be further explored in the next part.



**Figure 2.** This is the devise made by the inventor and presented to UIN's members as a comment to the post regarding the IB's improvement.

#### ***Part 4. Re-configuring spaces and users***

In what follows different engagements by other users and CP.co's practitioners will be leveraged in relation to the previous user (inventor's) posting to illustrate how the IB reveals potentials for the collective re-configuration of collaborative spaces.

[Two users' responses to inventor's post]:

"This is not my specialty, but both portable ladies' hair drying sets and hotel wall mounted hair driers have very flexible hoses of moderate diameter, and presumably also end fittings that might be adaptable."

"I would look for respirator hose for babies in hospital intensive care units."

[CP.co practitioner's response to inventor's post:]

"Personally I think that you with your great and innovative solution have shown the essence of what this site is all about: "if no one else can make the solution you need why not make it yourself?" When this is said I fully understand that it can be rather difficult to obtain the needed freedom to move around while sleeping for instance due to the limited flexibility of the repository hose. I am not aware that anyone inside the community is working on this exact issue at the moment, but I believe that you have shown a principle that would be relevant for a lot of our members and very interesting to improve in the future. I will try to have a talk with some of our experts here at CP.co and hopefully they will have some ideas for how to improve your solution further."

As can be seen IB is now interpreted by users as well as the practitioner – including the inventor – as an object to be dealt with rather than one which unequivocally enables. In other words it is not just an ordering device as it becomes qualified and thus re-ordered, re-configuring the UIN. No longer does it only engage potential users as a virtual reference to an array of

materials presented nor is it open for any kind of improvement, only some. The responses to the invention's content characterize the *collective transformation* that takes place in the re-configuration of a collaborative space (Boujut and Blanco 2003: 211). The users and the practitioner have now been engaged in IB's transformation process by negotiating the qualification of one of its constituents: The invention's content. Is the invention accepted in this particular post by those involved? Which parts of it are actually qualified, by whom and why are others not? It may be the "principle behind it" as the CP.co's practitioner puts it, but it may be the "hair driers" that UIN's users chose to respond upon. But certainly not everyone accepts everything. Thus the knowledge created through such qualifications entails tensions and thus spans the boundaries of both the UIN and CP.co, as it feeds off other local and distanced spaces of use. As an *epistemic object* (Ewenstein and Whyte 2009), the IB communicates possibilities and limitations it raises in the UIN, questions explicated for instance through the invention (see figure 2). Moreover we can argue that IB raises issues also about the virtual and conceptual space. In other words that the (re)configuration of its *constituencies* (A.telier 2011) is a process (but also an outcome) of qualification where tensions and negotiations are at play in-between them.

Through the various parts of this section (parts 1-4) that were unfolded, the IB may be deemed as constituting four co-creative spaces (Figure 3): (1) where IB's particular instantiations are mobilized for making users interested in the particular challenge; (2) where users and practitioners are co-configured as co-creators, and the negotiation of meanings is mediated; (3) where trade-offs take place during the qualifications of those involved; and (4) where ultimately, users as well as practitioners are re-configured.



**Figure 3. Four different spaces of the Innovation Box (IB).**

## DISCUSSION

In a broader context the reconfiguration of IB may be characterized as a collective approach to the *object of design*, in this case the improvement of IB (A.telier 2011). For the company CP.co, as well as members for the UIN alike, the IB initially engages them towards its improvement as a common focus but it transforms beyond that. This transformation can be described as actors' projection of new socio-material concerns in what had been seemingly stabilized relationships between users and practitioners (or customers and the company). In that way CP.co's envisioned use of IB as a virtual reference (Figure 1) is being challenged by users such as the "inventor" as new meanings (Figure 2) are projected, to the reference in question. The active interpretation by users through their engagement with the object of design may feed off concerns as to organizing aspects of co-creation. Virtual collaborative spaces such as UIN indicate that new socio-material concerns cannot be excluded from consideration. This is particularly relevant for CP.co as users are not necessarily delimited in their consideration of the collaborative space. Such new concerns being projected in a seemingly delineated collaborative effort (e.g. IB's improvement) may not only provide insights about users' needs but they may also regard reflections of product appropriation in every day use practices.

## CONCLUSIONS

This paper has explored the involvement of users in virtual spaces of co-creation, exemplified by the User Innovative Network (UIN). With spaces, in the *multiple* sense, this exploration has catered to how objects and members may be seen to engage in a mutual process of qualification, with the effect of reconfiguring the particular space at hand. Moreover, the notions of qualification and reconfiguration, seen as transformations, entail trade-offs in between users, practitioners and collaborative spaces. In the light of such trade-offs, which the transformations necessarily bear with them, the involvement of professional practices in co-creation may be challenged. With the role of objects as an analytical means to foreground the issue of virtual collaboration, the paper has argued that the particular instantiations of objects engage those involved differently, be they users or practitioners, from one space to another (exemplified in the four parts of the findings). Users and practitioners engage instantiations of objects in their everyday and professional practices and in the virtual collaboration, as they project them to co-creative spaces. The paper conceptualizes these references, first as *interessement* devices, but more importantly, as

*ordering* devices that order yet also *reconfigure* the roles of UIN members. Moreover we argued that such references act also as boundary and epistemic objects, where they enable members, in and through co-creation, to collaborate by raising qualification issues.

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# BETWEEN GENERATIVE PROTOTYPING AND WORK OF SYNTHESIS IN DESIGN: INTERPLAY AND ADDING VALUE IN THE EARLY CONCEPT DEVELOPMENT

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## ABSTRACT

*The paper analyzes a case in which generative prototypes are applied as part of a participatory design methodology to elicit insights from practitioners, and how these insights are translated and represented, to inform the following work of synthesis in design.*

*In literature, arguments are made for the value of involving practitioners as active participants in the development process, which holds the potential to develop innovative products. The paper unfolds a discussion on how knowledge from different sources can be qualified and re-qualified through a methodology of generative iterations, creating a valuable interplay between participatory sessions and background development work. Through an empirical study, it is analyzed how this can be achieved through intermediate methods informing decisions in design to be made based on practitioner wishes and desires, but necessitating re-qualification through iterations.*

*The paper concludes, that the methodology can frame a process of eliciting explicit and implicit knowledge from different sources, but that the designer, as being part of the entire process, comes to hold 'sticky' knowledge that difficult to transfer, which implicitly influences the design process. It is considered how such brokering of knowledge by the designer can have a role in the further downstream of product development.*

## KEYWORDS

*Design practice, generative prototyping, co-creation, knowledge creation, product development*



## INTRODUCTION

The iterative nature of design process, with work being problem-oriented and emergent rather than decided at the outset of design calls for the continuous collaboration with relevant stakeholders. To support an iterative and collaborative design process, participatory sessions are reported to be an appropriate framework (Buur & Matthews 2008). Particularly, ambiguous and open-ended materials such as simple prototypes, design games and other explorative tools are fit to motivate a participatory setting in which experiences, containing both implicit and explicit knowledge, can be accessed and explored in practice with stakeholders involved. The paper builds upon the value in such generative tools, and presents the staging of *generative prototyping* through participatory sessions as a methodology for practitioners to break out of taken for granted routines towards the development of innovative products. The paper aims to further analyze how knowledge from such sessions can be interpreted, represented and combined with other relevant 'design'-knowledge and thus translated to add value to the background design process taking place in between sessions. This raises three overall questions, which the paper addresses:

*How can knowledge be created and elicited as an emergent part of a participatory session?*

The paper presents the notion of *generative prototyping* as an approach to interest and involve practitioners, which arguably qualifies such creation and interaction between explicit and implicit knowledge.

*How can knowledge be translated from sessions to be representative and valuable among other sources of knowledge in the design process?*

Explored by giving an account and analysis of how knowledge from different sources are applied to act in the design process, upon entering a process in which different concerns are sought represented and negotiated, and where decisions are being taken by designers as work of synthesis in design.

*What are alternations between participatory sessions and work of synthesis in design doing to the overarching design process?*

Finally, it is discussed what characterizes the interplay between sessions and development work influence the design process, in relation to how the process is qualified and re-qualified through such iterations.

The paper presents its findings based on the analysis of a design process covering the fuzzy front-end towards a concept for equipment to be used by

fire fighters. Other stakeholders have been involved in the process, but present papers focuses on how fire fighters, as practitioners, were engaged. Empirical work presented originates from a Master's Thesis project in Design & Innovation in Engineering, at the Technical University of Denmark. The author of this paper was one of the two graduate students conducting the project, which will in the remainder of the paper be referred to as the *designers*.

## THEORETICAL BACKGROUND

Based on literature within participatory design and co-creation, arguments are made for the potential of involving stakeholders as active participants throughout the product development process. Suggested ways to achieve such participations are: in terms of staging participation (Visser et al. 2005), motivating generative behavior to elicit knowledge (Sanders 2002) and enacting the familiar and imaginative (Halse et al. 2010) as being ways to scaffolding ordinary people to contribute to the elicitation of tacit (implicit) knowledge for product innovation (Buur & Matthews 2008). To bring such behavior from participants in action, *generative prototyping* is introduced as an activity to act on the boundary between design knowledge from participants, processes and products (Cross 2006) through their framing, generation and enactment. It is deemed useful to perceive such prototypes, as well as other boundary objects (Star & Griesemer 1989) of the process as *intermediary objects* that are not passive representations, but rather *performative* (Danholt 2005) in that they mediate and translate knowledge across boundaries (Boujut & Blanco 2003).

To analyze and discuss how knowledge is elicited and dealt with in the process, the paper draws on theory of dynamic creation of knowledge within and between individuals. This is perceived as an iterative process involving both externalization of implicit knowledge and internalization of explicit knowledge becoming implicit (Nonaka 1994). To elaborate on how knowledge can be represented in other contexts, it becomes necessary to cope with the inherent 'stickiness' of knowledge, which is situated and rooted in the social practice enacted in participatory sessions, but 'applied' elsewhere (Brown & Duguid 1998). Such theories on knowledge creation and representation agree that it becomes a social process where individuals enter in dialogue with each other and develop a shared understanding through iterations.

Over the course of such interactions and mediations between stakeholders, the process leads to issues of significance emerging through collaborative

activities. It thus becomes interesting to analyze how these matters of significance emerge and are qualified through the interplay, within and between, participatory sessions and development work towards a shared understanding materialized as a, more or less, stabilized concept. The designers, being involved throughout the process, thus become central as *brokers of knowledge* (Brown & Duguid 1998) between participants of the sessions and other sources of relevant knowledge in the design of products.

## METHODOLOGY AND DATA

The presented generative methodology involves *generative iterations* throughout the entire process of designing products.



**Figure 1: Model sketching the generative iterations central to the methodology**

Such iterations revolve around the participatory session where knowledge is qualified through the generation and enactment of prototypes (Figure 1, right side). This knowledge is thus translated into the development work done in between sessions, before being re-qualified in following iterations (Figure 1, left side). Therefore, the participatory session is central to the approach as a means to allow for the co-creation of concepts during the entire process. The following section will describe and analyze such a *generative iteration*.

### Empirical data

The empirical study analyzed in the paper covers part of a project concerned with the development of equipment to be used by fire fighters to improve their performance when extinguishing fires inside buildings. Throughout the project, four full generative iterations were conducted. The data treated in present paper covers the conducting of the second generative iteration of the project, and consists of the three overall parts: 1)

Props, activities and conducting of Session II, 2) interpretation and translation of session and 3) development work and synthesis. Throughout the section, methods and process will be accounted for intertwined with analysis and reflection. The session was video recorded with two cameras placed at positions to give the best possible view of the activities of the participants and their actions. Presentation of data and its translation into the development work is highlighted by instances from the case where deciding concerns surfaced and were negotiated. Setting the stage of the generative iteration described was a process of interviews, observations, desktop research and a participatory session resulting in the focus on developing concepts for the water nozzle and self-containing breathing apparatus (SCBA) (see picture 1, below).



**Picture 1: Left: A water nozzle. Right: A self-containing breathing apparatus**

### ***Props, activities and conducting of Session II***

*Generative prototyping* as a notion describes the application of simple and malleable materials, props, that are put together to form simple prototypes of low fidelity and resolution (Houde & Hill 1997). Being open-ended and ambiguous, they should allow for a mediating dialogue and representation of design concepts between participants of the session. Session II took place in a small workshop located at the back of the garage in the fire station. To set the stage for generative prototyping in the session, the locality was prepared with inspirational material in the form of sketches with ideas for water nozzle and SCBA, respectively. A range of props were put on the table, including: packaging foam, cardboard, markers, elastic and some precut 'basic' shapes, to make the activity more accessible (Sanders 2005). A protocol for the session was made to plan the session to last for about one hour. The protocol was divided into three activities to allow for the creation of two prototypes (one for water nozzle and one for SCBA) and a final activity involving the enactment and demonstration of the generated prototypes.



**Picture 2: The stage of Session II containing props and inspirational sketches**

Prior to conducting the activities of the session, the participants were divided into two groups consisting of 2-3 fire fighters (practitioners) and one designer. This was done both to create groups of a size where all could be involved in the generative activities and also to make the final enactment activity possible. To kick off the session, the practitioners were presented with the agenda and introduced to how the designers imagined them using the inspirational sketches and props to create prototypes. To do this, they were asked to pick out 2-4 sketches to inspire their prototype generation. During the activity of generating prototypes, the participants initiated a discussion, started mainly by sketches. At first, the fire fighters were a bit hesitant to start applying the props and putting together prototypes, resorting to mainly picking up some of the basic shapes and using them to demonstrate certain points in the discussion. These demonstrations were supported by the designers starting to put together props into prototypes in parallel to the dialogue between all participants, which in turn helped the practitioners in elaborating on their narratives. Following the generation of the prototypes, the practitioners were asked to present them to each other. This enactment of the prototypes was characterized by the practitioners being physically active, gesturing and mentioning how the imagined context of use would affect, and be affected by, the prototype concept. Further, they challenged each other in their presentations and how they would affect new working practices, which surfaced trade-offs that were based on taken for granted conditions, agreed upon between practitioners as well as now apprehensible possibilities for changed contexts facilitated by the prototypes. This process of relating the prototypes to practice seemed to be an effective way externalizing implicit knowledge.

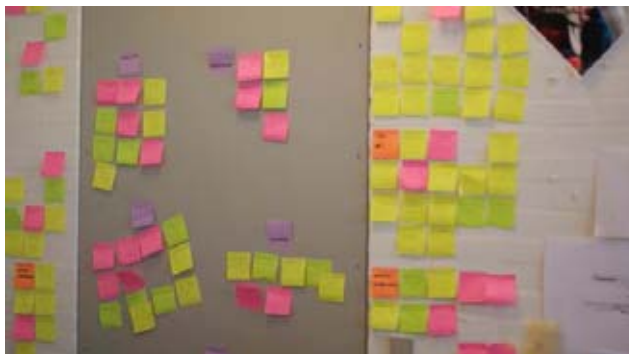


**Picture 3: Practitioners generating prototypes during Session II**

Over the course of prototype generation and enactment, the prototypes became intermediary objects that mediated, and thus qualified a shared understanding and new meaning to the involved participants. This process involved the creation of both implicit and explicit knowledge in parallel and thus resulted in the prototypes representing the session with its discussions and negotiations (Cramer-Petersen & Marijnissen 2012).

### ***Interpretation and translation of session***

Afterwards, the recorded session was reviewed as a process of both designers looking through the video material together, and taking notes on post-its, which gave a basis for discussing what could be deemed relevant. As such, post-its could both hold quotes, observations, viewpoints or random thoughts triggered from watching the material. For later use, each post-it that referred to a particular action in the session was tagged with a time-stamp. Here, it is important to make a note that knowledge from the sessions was not the only source to the Affinity Diagram (Kawakita 1982) emerging from the post-its. Desktop research and notes from interviews with other stakeholders were also added in order to get perspectives on issues regarding the development of equipment for fire fighters.



**Picture 4: Part of the affinity diagram after Session II**

Following the review of the session recordings, a process of interpretation of data began. Contrarily to their function as intermediaries during the session, the generated prototypes lost most of their ascribed meaning outside the session context, which made them unfit for analysis on their own. Rather, through the recordings of the session, which also contained all the actions taking place around the prototype, it became possible to foster a meaningful translation to add value to the development work. Through the Affinity Diagram, the knowledge, from session and other places, became possible to sort into both existing and new categories by the designers. The designers here made an effort to be open to new interpretations and insights that might not correspond to earlier findings, in order to allow for new categories through combination of knowledge from different sources.

### ***Development work and synthesis***

This section investigates how the translated knowledge from the session was applied to add value in the development work by influencing the synthesis towards a more detailed concept. At this stage of the process, to further elaborate on the concepts in development, different methods were applied, as described in the following. Accordingly, these design methods were intended to both externalize *design thinking* and formalize the interpretation of knowledge available towards a problem-orientation and synthesis (Cross 2006). As such, the background work of synthesis in design is intended to further qualify the concepts at hand, but doing so in a reflexive manner assisted by robust representation of practitioner insights and applied design methods. The development work is communicated in a way that attempts to highlight three central discussions and negotiations that occurred between the designers and resulted in decisions that seemed to shape the following design process.

A first important decision taken in the development work was to focus on the further development of an SCBA rather than the water nozzle. This was based on the interpretation of a greater potential for improving visibility in darkness and smoke, through a built in thermal camera and display. Further, it was deemed to be able to accommodate for a radically different practice of extinguishing fires. Undertaking this decision, the categories of the Affinity Diagram were central to assist the designers. This way, the Affinity Diagram became a method for coding and evaluating accumulated knowledge towards synthesis of a concept. Post-its concerning issues no longer deemed directly relevant to the process were put to the side of the diagram, but not removed. This led to an iteration of negotiation and interpretation of knowledge amongst the designers. Attention now moved towards finding technologies that could make the SBCA with integrated

thermal vision feasible, which resulted in an Internet search for similar products and technologies. Following this, a design specification was formulated, containing requirements and criteria for the concept, creating an explicated frame of reference for the project.

A second decision in concept development originated as the design specification raised inquiries into how to operate the concept in development. Here, a piece of dialogue from the session was found interesting by the designers. During the generation of prototypes of the water nozzle, both teams had imagined functionality aimed at one-handed operation. Through the enactment of the nozzle prototypes the following was expressed:

“Sometimes you hold, for instance, a ceiling tile [...] then you need to let go and turn on the water. That is annoying. [...] If you make a trigger, here, [to give one-handed operation] it would be brilliant.”

Session II, practitioner 1

“Then you could think it further and make a switch, like this, that changes the water beam [all with one hand]. When you are lying [on the ground], you could change everything with the other hand free to support you.”

Session II, practitioner 2

This contradicted what had been said through interviews earlier in the process, where the fact that existing nozzle require at least two hands to operate was not problematized by the practitioners. During the work of synthesis, this piece of dialogue serves as an example of what was deemed relevant by the designers and became an important argument in the resulting work. This points to the importance of going through all material without prior distinction of what might be more relevant, and furthermore, as it turned out that even though the other concept direction (SCBA) was chosen, the meaning of the discussion became deciding for the further development.

A third area of particular discussion was regarding the Lung Demand Valve (LDV), which functions to reduce pressure from the air flask to the mask. It is currently placed on the front of the mask, and this is also where the fire fighters expressed a desire for it to be placed during Session II. However, the designer' insights into other technically feasible structures of the SCBA and knowledge within fluid dynamics, coupled with utterances from the fire fighters that sometimes the LDV could get in way and block visibility, was interpreted differently. While the designers negotiated between such different perspectives, decisions became more ambiguous by intertwining and combining knowledge from different sources through the Affinity Diagram and design specification. This process of increasing



ambiguousness highlights that the interpretation and representation of practitioner's insights becomes less useful over the course of the development work, even with the steps taken to translate them into this other context – the value of practitioner knowledge thus trail off over the course of the development work.

A point to make from these three examples is that decisions are made fluently based on knowledge from different sources. The development work can be enriched by applying the Affinity Diagram as a way to retain the designer's awareness on both explicit knowledge, put in words, but also implicit knowledge from the representation that the diagram, more or less, becomes of the session activities. However, as it becomes more difficult to retain perspectives from the session after decisions are made, a process of re-iterating becomes relevant through the introduction of a new session, which was also the next stage of the project work.

## FINDINGS

It was found that the generative prototyping became an intermediary object for the creation and negotiation of new knowledge in the session. As such, examples were found of utterances contradicting that was seen in observations and expressed by practitioners through interviews. Therefore, the generative methods applied have the potential to elicit implicit and explicit knowledge through generative sessions. However, after the session, the design value of the prototype itself diminished, but moving rather to become enacted in the design process through the video recordings and the Affinity Diagram. A central argument here, is that this ability to apply knowledge from prototype to video to the Affinity Diagram, and further to become influential in the synthesis work, stem from the designer's actual participation in the sessions. This can be explained by the highly social character of knowledge creation, and the resulting lasting implicit knowledge between participants of the sessions, which influenced decisions made in the development work done (Nonaka 1994).

It can be questioned whether the representation of knowledge from session to development work can actually take place without the mediation of the applied methods towards this objective of securing unambiguous representation, and whether it is wishful at all. The role of the designer, as being present in both the session as well as doing the actual work of synthesis, allows for decisions being made based on both implicit understandings and knowledge made explicit. These decisions are consequently mediated by the designers in an esoteric manner difficult to

describe in explicit terms, often referred to as *design thinking*. Present methodology of generative iterations, aims to provide a frame for taking such decisions in a manner that retains meaning to the practitioner by introducing alternations between participatory sessions and development work. Through iterations, it becomes possible to qualify and re-qualify a focus for development in collaboration with the stakeholders (fire fighters). This qualification of the process introduces irreversibility in the sense that the participants of the process align their understanding of the problems at hand continuously (Callon 1991) through making decisions from concerns based on shared knowledge. The methodology further attempts to qualify these implicit decisions, as were elaborated through instances of significance in the development work. In this interplay between sessions and development work, designers become knowledge brokers able to make 'sticky' knowledge valuable in different settings (Brown & Duguid 1998) through participation and negotiation towards the synthesis of a concept. This ability to broker the diverse knowledge is dependent on the intermediary functions of the methods and tools applied, as stated in the above, and thus call for reflexivity in their application. Towards the design of products, knowledge is therefore not a goal in itself, but rather something to be applied and qualified towards the cultivation of new conceptual meanings and eventually products. Towards such further development of concepts, departing from the central role of the practitioner, and introducing other central stakeholders, e.g. within an organization developing and manufacturing products, further research in this field could look into the designer applying and maintaining this role of brokering knowledge in the downstream product development, as a means to promote collaboration and an approximated representation of the practitioner.

## CONCLUSIONS

The paper has argued for a methodology consisting of generative iterations as a way to create interplay between sessions of co-creation and participation and background work of synthesis towards the design of innovative products. Through an empirical study, it is shown that by applying generative prototyping as a method to elicit explicit and implicit knowledge from practitioners in sessions, and by reviewing video recordings of these sessions, it becomes possible to translate valuable user insights into the development work. The paper concludes that the methodology can provide designers with a valuable frame for qualifying concepts in collaboration with practitioners, but in doing so must be able to handle and broker between (contradicting) knowledge from different

sources and in iterations between sessions and development work. Further, the paper describes the possibility of further qualifying the methodology through designers brokering practitioner insights and meaning as part of the downstream process towards a product being marketed.

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# Workshops as tools for creative collaboration: finding a balance between facilitation and auto-organization

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## ABSTRACT

*This paper analyses four settings of so-called collaborative “creative workshops” (their methods, logistics, regulation processes) and provide peepholes on their respective features, with the informed goals of defining criteria for comparison, finding shared essence and distinctive characteristics. Key aspects such as time, facilitation and auto-organization shape a “creative continuum” that formalizes how creativity can be stimulated and how participants might collaboratively develop creative behaviors.*

## KEYWORDS

*Creative and collaborative workshops, creative tools and methodologies, impact of time and regulation on collective creativity.*

## ABOUT CREATIVITY

*Creativity, innovation, creative economy or creative management are timely topics in fields such as design, economics, education or innovation research. Various initiatives around these concepts take place and, among them, invitations to experience hands-on, practical approaches of creativity - what we will call in this paper “creative workshops”.*

The emergence of these workshops raises various fundamental questions about creativity. One of them concerns its very essence: can we teach it? When it comes to educate to creativity, two schools of thought coexist. Indeed, if creativity has long been considered by most as an un-explainable gift that cannot be learned nor taught (MacKenzie, 1998), others start formulating divergent opinions: properly structured by tools and methodologies, creativity (or contexts favorable to creativity) could emerge

from progressive and repetitive practice (see for instance Treffinger, 1995; de Bono's, 2007; David Kelley's work at Stanford's d.school or broadly broadcasted online booklets and tutorials like Byron, 2009).

Following Popper and his seminal work on falsification (1934), we in turn believe that an accumulation of confirming instances is not enough to built universal generalization about such un-teachable creativity. Moreover, according to Kuhn (1962), *"in the practice of science, scientists will only consider the possibility that a theory has been falsified if an alternative theory is available that they judge credible."* Our hope for this paper is therefore double: first to demonstrate that various forms of training to creativity do coexist and, through careful examination of their methods, features and structuration, to secondly see how creativity can be taught or, at least, stimulated, supervised and positively focused. For a long time prevailing, the paradigm of creativity seen as a gift is today re-examined.

## CONDITIONS FOR STIMULATED CREATIVITY

Building on the assumption that stimulated creativity can indeed take place inside specific conditions, we investigated the literature to see what those conditions could be. Three key aspects seem to impact creativity: working together vs. working alone; working inside homogeneous vs. heterogeneous groups and being regulated vs. totally free in terms of timing, sequences of tasks, tools and methodologies to use. Abundant literature can be found about those criteria and their articulation with creative teams and their "performances" (for a complete review, see Paulus, Dzindolet and Kohn, 2011), but for most of them no real consensus seems to emerge.

To begin with, there is no certitude about the added value of ideating in groups rather than alone. On the one hand, some research shows that groups are less efficient and effective than individuals when generating ideas (Diehl and Stroebe, 1987; Mullen, Johnson and Salas, 1991). Diehl and Stroebe (1987), for instance, found evidence of production blocking during group brainstorming. They suggest that group members are unable to express their ideas as they unfold in their minds because they have to wait their turn to speak. In the meantime, participants may forget their ideas or decide they are no longer relevant. Social comparison may also be associated to social loafing, individuals showing less effort in a group because responsibility is diffused (Latané, Williams and Harkins, 1979). Anxiety eventually reaches some group members when they are about to share their ideas (especially the most radical ones), since they don't know each other very well (they don't form a *team*) and since others might react

negatively to them (Paulus et al., 2011). On the other hand, other researchers argue that team creativity is much more than the sum of its individual group members' creative output (ibid.). Cognitive and motivational processes may indeed help a team be more creative than its isolated members. Studies have shown evidence that team brainstorming push people to think of other categories of ideas, which they might have otherwise neglected. Beside that fact, sharing ideas can stimulate production of other related ideas or even combination of several ones to generate more novel or useful ideas (Osborn, 1957; Treffinger, 1995; Paulus, 2000; Santanen, Briggs and De Vreede, 2004).

Besides this group/team vs. individual aspect, no real consensus is either found in terms of groups' homogeneity. Regarding the effects of diversity on team performance, some studies find positive effects, others negative effects (Sutton and Kemp, 2006), and some find no effects at all (Paulus et al., 2011). "One of the problems with diversity, especially background or demographic diversity, is that individuals are naturally socially inhibited in diverse settings. They may not feel free to say what comes to mind; they may feel they have to go through some diversity censoring process" (ibid., pp. 336-337).

Eventually, another open question concerns people, tasks', logistics' or tools' regulation. Supporting the autonomy perspective, some argue that teams need sufficient freedom to take initiatives and make good use of their diversity, whereas tightly constrained and overly structured tasks supposedly hamper their creativity (Isaksen and Lauer, 2002). « Managing the source of authority for groups is a delicate balance. (...) The end, direction, or outer limit constraints ought to be specified, but the means to get there ought to be within the authority and responsibility of the group » (ibid., p. 78). Looking yet at the difficulty to manage more heterogeneous groups, some other argue that collective creativity reaches its best potential only when facilitated, as suggested by Osborn already in 1957.

There is indeed some evidence that group productivity is increased while in presence of facilitators, which may then play several key roles (Offner, Kramer, and Winter, 1996). They insure psychological safety for all participants, through application of some basic functioning rules. Deferment of judgment, for instance, is fundamental for efficient group brainstorming (Osborn, 1963; Schächter and Taddéi, 2010). Diehl and Stroebe (1987) suggest that lowering apprehension about sharing ideas is another way to increase ideas' generation. Facilitators can also structure the interaction process to minimize participants' cognitive load (Paulus et al.,

2011). Because collaboration is complicated (even for highly motivated teams), any simplification of interaction procedure potentially eases coordination and idea generation processes. Facilitators can eventually resort to creative techniques, tools or methods that help participants escape their own personal and dominant paradigms. The research developed by Carrier, Cadieux and Tremblay (2010) shows that originality of ideas depends on the techniques in use: participants only encouraged to cognitively react inside their traditional frameworks and models of thoughts develop less radically new ideas than participants stimulated to broaden, or even surpass, these frameworks.

In front of these sometimes-contradictory results, we suggest to build tools to systematically analyze and compare particular forms of creative workshops. Looking at several dimensions, our goal is to more clearly identify what constitutes the shared essence of these so-called creative workshops (and what, on the other hand, differentiates these workshops from each other), and to gain a better understanding of the key aspects potentially useful to teach – or stimulate – collaborative creativity.

## METHODOLOGY AND DATA

A three-steps methodology was constituted to gather and analyze data issued from four distinct creative workshops. Each workshop was first thoroughly attended by one, sometimes two researchers (one presenting a background in engineering and social sciences, another in criminology and social sciences, and the third in business, economics and management). Once integrated to the workshop and presented to the participants, ethnographic field research was conducted (i.e., developing critical and socially embedded understanding of experiences and phenomenon through close exploration of several types of data, such as active notes taking, audio-video recordings, open but targeted interviews, ... see Ingold, 2008). This situated field research ended up in written “story telling”, whose extracts are presented below. Inside each situation, one researcher also conducted participative observation, either as participant or as facilitator.

The three researchers then constructed an analytical grid in order to systematically compare the four settings. Each researcher separately filled-in the grid and results were eventually recorded, compared and discussed until final consensus was found.

## Four workshops, four stories

This section presents short extracts of stories written for each of the workshops. A more detailed description of each workshop is summarized in Appendix A.

### ***ARC – Creative Reflection Accelerator (or “Accélérateur de Réflexion Créative”)***

Created by the University of Liège PSGO service (for “Psychologie Sociale des Groupes et des Organisations”), the ARC is a creative setting which goal is to support and cover participants through the whole problem-solving process, from problem reformulation to ideation and implementation. Inspired from the Osborn’s and Parnes’ “Creative Problem Solving” process (or “C.P.S.”, for further information see Isaksen and Treffinger, 2004), it calls for group creativity to solve a project holder specific request.

“December 2012, some twenty participants (professional from various backgrounds, that never met before) are gathered in the “Horloge” halls in Namur, to give a creative boost to three project leaders active in very different areas: private anti-flood protections, aromatherapy consultancy and jewelry. [...] After reception and breakfast, participants are divided into three groups, one per project leader. Each group is accompanied by one facilitator, whose role is to ease the expression of a large number of original ideas and the construction of bold solutions inside a friendly and relaxed atmosphere. [...] Each facilitator guides the group through a pre-defined and timed set of activities: icebreakers to start with, followed by creative warm-up exercise, then problem presentation, brainstorming and selection of ideas, eventually solution conceptualization. From one activity to another, various techniques are mobilized: mind-mapping, sticky notes brainstorming, forced connections, idea box, conceptual cards and so on. [...] Facilitators maintain the group energy level, reassure participants and encourage them to express their ideas. [...] Once the half-day workshop done, participants gather in the reception room to share a last meal.”

### ***Ideation***

Ideation is a program reserved to ten or so researchers issued from diverse disciplines, supervised by three facilitators. This program pursues two main goals: first to find new applications to three Belgian university-born technologies (and this way to constitute an inspiration source for holders of these technologies) and second to educate researchers to creativity through practice (and more specifically the C.P.S. method and its techniques) with the hope that they will later implement these creative methods into their own every-day work. The program, with a total duration of four full days, is split into two steps: first a 3-days residential seminar and second, one month later, a one-day close-up meeting. Each of the three technologies is



worked on in average 10 hours by all researchers, split into multidisciplinary groups.

“August and September, 2012. The first day of the residential seminar was dedicated to sensitize the 14 researchers to the theoretical aspects of creativity and the C.P.S. method (and its five steps, “Problem reformulation – Ideation – Evaluation – Development – Go!”). During the next two days, researchers collaboratively put into practice the first three steps of the C.P.S. method and applied them to the three technologies earlier selected and presented by the facilitation team. [...] Each technology is tackled by groups of 4 or 5 researchers, let by three facilitators. The three first steps of the C.P.S. methods are organized through pre-determined techniques and precise timing which respect is crucial, since each researcher and each re-composed group needs enough time to successively work on each technology. [...] After three days of hard and challenging work, the 14 researchers have written more or less fifty “idea cards”, just as many as possible new concepts for the three Belgian technologies. One month later, the same group of researchers get together for the last step of the program, which is the development of some of the “idea cards” selected meanwhile by the project holder. The day ends with the final presentation of the results.”

### ***Ideative***

Ideative is a three-days workshop designed for university and high-school students and organized inside the larger and international framework of a competition called the “24 hours of innovation” (ESTIA, 2013). Similarly to the previous workshop, the C.P.S. method frames some theoretical and practical sensitization to collaborative creativity, taking place here during the two first days of the program and managed by a professional creativity consultant. As soon as the first day, students are spread in multidisciplinary teams (counting at least one designer, one engineer and one manager) that will remain the same through the whole program and competition. The 24 last hours are dedicated to the competition itself, taking part synchronously in different universities or high schools all over the world. The program ends with a 3 minutes presentation in front of a local jury, whose task is to select the best concept or solution.

“Friday, October 19<sup>th</sup> and Saturday, October 20<sup>th</sup>, 2012. The competition has started: teams just received several cards shortly describing projects submitted by the remote industrial and entrepreneurial partners. Over a 24-hours period, teams will separately have to develop a new concept or solution to the problem they chose to tackle. [...] During the whole process, teams are free to organize themselves the way they want. Three milestones are nevertheless suggested: problem reformulation should be over within the first couple of hours, time should then be spent on ideation and evaluation, without neglecting the few

hours needed to develop and prototype the final concept or solution. [...] A group of rotating facilitators checks the course of project management, answers questions, supports the students and provides advices to help them make correct use of the creative tools and techniques they were just taught.”

### ***Charrette***

The well-known “Charrette” concept puts together local residents and “designers” (in the broad sense of the word) to work in an interdisciplinary, community-based way (Sutton and Kemp, 2006). Far from the participants’ normal routines, the Charrette “puts people into a temporary pressure-cooker with stimulating visual and human resources” (ibid.) to encourage them to solve a purposeful social issue and become co-learners. The “pressure-cooker” aspect of this workshop led to its name as, according to the folklore, the 1800s Parisian students attending the first year of architecture had to hurry to finish their assignment aboard horse-drawn carts, on their way to final reviews. The students drew until the very last moment on those “charrettes”, and the term is still used today to describe the frenetic activity preceding any final presentation.

“Dublin, November 2012. Co-organized by the Toronto Institute without Boundaries (IwB), the Dublin city council, the Dublin Institute of Technology and the Design21C company, this year challenge for the thirty participants is to reinvent public services for Dublin citizens, given a complex environment and limited resources. During 5 days, 5 teams work simultaneously on this common brief but for distinct Dublin areas. Each team gathers students, community members, city council workers and professional architects and designers. [...] Without being explicitly built on the C.P.S. method this time, the whole process is nevertheless structured on a similar framework. Punctuated by opening and closing plenary sessions and three guest lectures, the process indeed includes ten stages spread out on the five days: getting to know each-other, the program and the city; services cartography around Dublin; selection of a public service; on site exploration and interviews; goals definition; brainstorming; collective concept selection; concept development; deliverables and, eventually, final presentations. [...] Although this ten-stage procedure is really clearly inscribed inside each participant’s agenda, teams are nevertheless totally free to auto-organize inside each stage and to choose whatever method they think is best to reach each milestone. [One researcher doing participative observation notes:] In my team, working together seems quite challenging. Team members have the feeling they spend too much time discussing and trying to agree, without really knowing what to agree on. [...] From time to time, IwB staff members visit the teams and provide a few advices. The week is moreover punctuated by two “advisor sessions” and one “team leader check-in”, the former being a time for each team to receive feedback from experts, the latter being a debrief organized for IwB participants, leaders of their own team.”

## Criteria for comparison

In order to gain information on creativity and its practical, hands-on aspects and to find common basis for comparison, it was decided to focus only on “active and creative” moments of each of the four workshops. Periods dedicated to theoretical sensitization to creativity, creative methods or tools were therefore not considered here, neither were short exercises for practicing these methods if they didn’t relate to the project holder’s main concern. Five criteria were chosen for systematic comparison: (i) overall duration; (ii) active participation of facilitator(s); (iii) process structuration through methods, techniques or tools (linked to creativity or not: for instance brainstorming, field research, ...); (iv) prescriptive use of *creative* methods, techniques or tools; (v) regulation, in terms of roles’ emergence and autonomy towards the overall process. Each criterion is evaluated by each researcher, separately and for each of the four workshops, following a “yes/no” or a 5-points Likert scale (for more details, see Appendix B).

After comparison of each researcher grid, inter-reliability was found good enough for the scope of this paper (even if not statistically tested). For 85 % of the criteria, researchers had indeed separately chosen the same value and for the remaining 15%, judgments never differed more than one interval in the 5-points Likert scale. Consensus was consequently quickly found and enabled to reach the results presented in next section.

## RESULTS AND DISCUSSION

The intent of this paper is not to compare the four workshops in terms of creative levels reached. The contexts and the nature of each challenge are too different to tell which setting created the most creative outcomes and creative experience for the participants. Next section will rather investigate what they have in common that could define the essence of “creative workshops”.

### Similitudes

While remaining empirically based and exploratory, our description and analysis grids (see Appendix A and B) constitute efficient tools for the comparative analysis of the workshops. They enable us to distinguish the following four criteria as common ground for those four creative settings:

- 1) All participants adopt a **creative posture** (either spontaneously or after warm-up exercises): they have a positive mindset, all of them

voluntarily decided to take part to the workshops, which decisively contribute to the overall success of each initiative;

- 2) Project holders and facilitation teams pay close attention to the **problem formulation**: neither too broad nor too technical and directing in the solution they call for, problems remain creative and motivating in their formulation;
- 3) All groups and teams are build on **mixed profiles**: from various background, age, expertise, culture and gender, people of diverse profiles offer each-other purposeful feed-back and insights;
- 4) All four settings share a common concern for **organizational aspects**: whatever the option chosen in terms of regulation, logistics, timing and sequences of tasks are cautiously designed beforehand.

We argue that these four factors do constitute the essence of creative workshops, and that they should consequently be put on the agenda when planning such initiatives.

## Differences

The five main criteria chosen for comparative analysis (namely duration; participation of facilitator(s); process structuration through methods, techniques or tools; prescriptive use of creative methods, techniques or tools and regulation in terms of roles and towards the overall process) later revealed to also be the main criteria for workshops' differentiation.

More detailed results (gathering consensus between the three researchers) can be found in Appendix C, while Figure 1 offers a visual formulation of those results. It reveals distinct profiles for each workshop, with ARC and Ideation workshops sharing common features compared to Ideative and the Charrette.

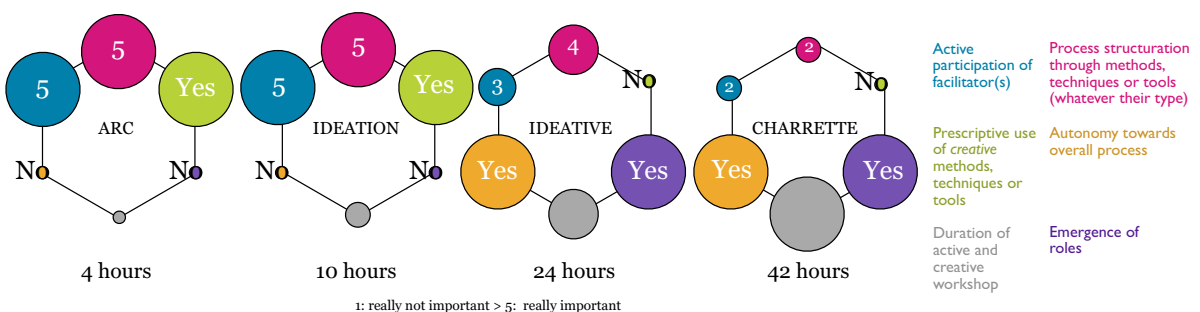


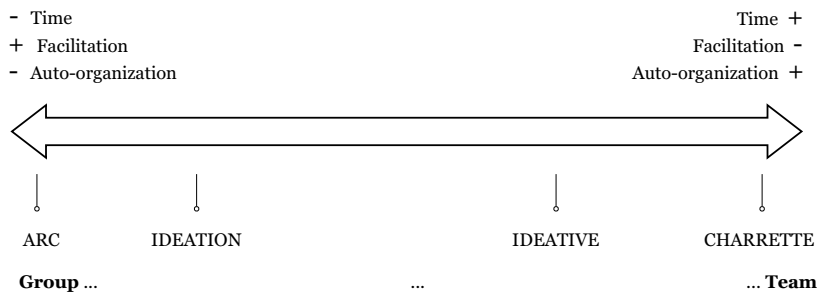
Figure 1. Visual formulation of the results for each workshop.

## One continuum, two parameters for creative collaboration: time and regulation

Looking at Figure 1, the four creative workshops we analyze in this paper indeed seem to polarize themselves on a continuum characterized by two different profiles. Table 1 synthesizes those profiles – and how the criteria group inside each of them - while Figure 2 formalizes this “creative continuum”.

Auto-organization	Facilitation
Autonomous emergence of roles	No spontaneous emergence of roles
Light structuration of the process through methods, techniques or tools	Strong structuration of the process through methods, techniques or tools
Total autonomy towards the process	No autonomy towards the overall process
No prescriptive use of creative methods, techniques or tools	Prescription on how and when to use creative methods, techniques or tools
Light structuration by facilitator(s)	Strong structuration by facilitator(s)

**Table 1. Synthesis of both profiles and their characteristics.**



**Figure 2. Visual formulation of the creative continuum.**

This “creative continuum” illustrates two open options for organizing a creative workshop as well as the impact those options have on how people will collaborate. On the one hand, short timing and constrained, strong facilitation processes do not allow participants to auto-organize. In these conditions, participants constitute a group rather than a team, since they are invited to offer individual knowledge and creative outputs rather than discussing tasks’ repartition, roles and interdependencies. On the other hand, longer workshops with less active participation of facilitators and more space for autonomous organization open possibilities for participants to get to know each other better and to develop team ownership.

In both cases, interestingly, these creative workshops (whatever their distinct features) are recognized as effective ways to practically stimulate creativity. Qualitative analysis of the verbatim indeed reveals that

participants who took part to highly constrained workshops (in terms of tasks sequences, facilitation, time constraints) found their creativity level incontestably higher than before. One “Ideation” participant for instance explains:

“I amazed myself in terms of what I was able to do in collaboration with others. I discovered I was a creative person, I discovered how to do that and how to transmit that creativity to others” (free translation).

In less constrained environments such as the “Charrette”, comments are rather oriented towards team building and team spirit and paradoxically less towards levels of creativity reached during the workshop, even if those are also considered as good. Ideative finds itself in an intermediary position, participants being autonomous in their use of creative tools thanks to the intense sensitization to creativity they received during two previous days. Worth to underline, though, is that these two profiles of regulation should not be considered as opposite, but rather as complementary ways to awake participants to their creative potential.

## CREATIVE WORKSHOPS: HOW ABOUT TRANSFERRING THEM TO THE ECONOMIC WORLD?

After providing tools for comparative analysis of four creative workshops, this paper identified shared essence of such creative settings as well as their differences. A better understanding of key aspects such as time, facilitation and auto-organization helped draw a “creative continuum” that impacts how creativity might be implemented and how participants might collaboratively develop creative behaviors (inside either groups or teams).

Next challenge would be now to transfer those workshops to companies: usually organized inside academic environments, this particular way of using creative methods, techniques and tools is indeed not integrated to companies’ and institutions’ daily habits and still too often considered as occasional or “for fun” exercises.

Integration of creativity (its practice, its management) is yet today required at each level of organizations, the current economic situation making it vital for their survival. Creativity is nowadays considered as essential oxygen, enabling them to permanently question their ecosystem and to respond, in an agile way, to continuous changes inside this ecosystem. Change is not to be considered as an obstacle anymore, but rather as a challenge or opportunity to positively evolve inside a competitive market (see Streliski,

2013). As John Howkins, one founding father of the creative economy model, states:

“Creativity is not new and neither are economics, but what is new is the nature and the extent of the relationship between them and how they combine to create extraordinary value and wealth” (2002).

Collaborative by essence, appearing at the interface between knowledge, skills and hierarchy, open and transverse, sometimes dissident, creative workshops surprise by their playful side, consequence of a meeting between collective work and particular tools. Today incompatible with a business culture where innovation is either totally neglected or compartmentalized inside R&D departments, creative workshops call for a new form of management. Tolerance to hybridization, irreverence towards the hierarchy, acceptance of doubts and ambiguity about results that cannot be predicted are some of their inherent aspects, as many potential reasons to discourage organizations to accept and incorporate creativity as a posture. Transfers between creativity and the business world is nevertheless a reality inside well-known companies such as Ubisoft®, Apple® and the “Cirque du Soleil®” as well as inside smaller Belgian SMB’s like “The Smart Company®”. We modestly hope that this paper, illustrating various ways to stimulate creativity, will be added to the accumulating arguments inviting to this transfer.

## ACKNOWLEDGMENTS

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## APPENDICES

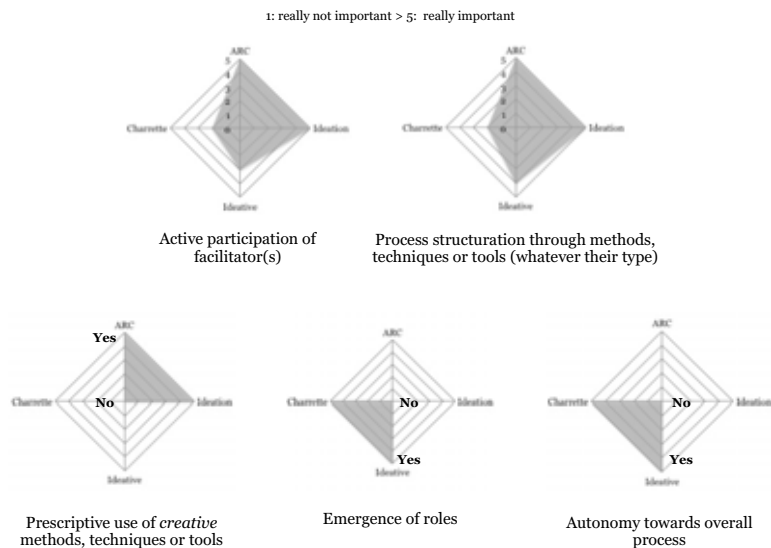
## Appendix A - description grid of the four workshops

WORKSH- OP NAME	PARTICIPANT	ORGANISATION	GOAL	CREATIVE TECHNIQUES and MILESTONES	DESIGN TOOLS	NOTES
	* # * BACKGROU ND * COLLABOR- ATION MODALITY	* LENGTH * TIME-FRAME * CONTEXT * EXECUTIVE STAFF * DELIVERABLES	*TIME OF DEFINITION *SHARING *PROJECT HOLDER *CREATIVITY	*TYPE *STRUCTURE *AUTONOMY	*TYPE *STRUCTURE *AUTONOMY	
ARC	<ul style="list-style-type: none"> <li>* 5 to 7* 3 teams</li> <li>* selected with the help of the giver - students and professionals, various backgrounds .</li> <li>* relaxed but stimulated participation</li> </ul>	<ul style="list-style-type: none"> <li>* 1/2 day</li> <li>* structured in 7 phases with limited timing - 3 simultaneous workshops on different subjects with shared breakfast and lunch</li> <li>* separate teams except during lunch times</li> <li>* 1 facilitator (&gt; active help) per group</li> <li>* very clear deliverables (2-4 conceptual solutions to the problem + a large variety of ideas + a classification of preferred ideas according to their nature)</li> </ul>	<ul style="list-style-type: none"> <li>* before the workshop (during interview n°1)</li> <li>* shared by whole team</li> <li>* problem to solve is given (imposed by staff and giver - not met)</li> <li>* explicit reference to creativity and CPS process (participants interested in discovering a method)</li> </ul>	<ul style="list-style-type: none"> <li>* CPS (Creative Problem Solving Process). Workshop only about ideation and solving - practical sensitization</li> <li>* 7 phases: introduction; getting to know each other; creative warm-up; problem presentation; brainstorming (mind-mapping, brainstorming, forced connections, idea box); idea selection; conceptualization</li> <li>* 100% structured</li> <li>* 0% autonomy</li> </ul>	<ul style="list-style-type: none"> <li>*mind-mapping, sticky notes, concept sheet, story cubes</li> <li>*Highly structured</li> <li>*Low autonomy</li> </ul>	<ul style="list-style-type: none"> <li>* very short in time</li> <li>* possibility for participants to ask questions about the problem and for the giver to reframe it if necessary</li> </ul>
IDEATION	<ul style="list-style-type: none"> <li>* 14 people, 3 groups</li> <li>* researchers from various backgrounds</li> <li>* stimulated participation</li> </ul>	<ul style="list-style-type: none"> <li>* 4 days</li> <li>* 2 phases: 3 days residential workshop (1 day per technology) ; one-day meeting (one month later)</li> <li>*2-3 facilitators for all 14 people</li> <li>* 50 «ideas cards» &gt; develop a few of them (selected by the giver)</li> </ul>	<ul style="list-style-type: none"> <li>* 3 technologies chosen beforehand (new applications for three new technologies)</li> <li>* 1 technology shared inside each group, each participant tackles each technology inside ever changing groups</li> <li>* givers not met (until the last day)</li> <li>* explicit awareness to CPS + practical sensitization</li> </ul>	<ul style="list-style-type: none"> <li>* CPS (Creative Problem Solving Process), explicitly presented (sensitization and education to creativity)</li> <li>* Workshop: theoretical formation to CPS method and its 5 steps (1 day); workshop on problem reformulation; ideation; evaluation (2 days) with focus on selected technologies; late conceptualization (one month later) of ideas cards selected by the giver (1 day)</li> <li>* 100 % structured</li> <li>* 0% autonomy</li> </ul>	<ul style="list-style-type: none"> <li>* final presentation on mood boards</li> </ul>	<ul style="list-style-type: none"> <li>* impact of incubation</li> <li>* final ideas to conceptualize: chosen by giver</li> </ul>
IDEATIVE	<ul style="list-style-type: none"> <li>* 30 Master students, teams of 5 or 6 students</li> <li>* designers, managers, engineers, architects, psychologists</li> <li>* relatively free</li> </ul>	<ul style="list-style-type: none"> <li>* 3 days</li> <li>* 2 phases: 2 days theoretical formation; 24 H workshop</li> <li>* 1 consultant in CPS for the 2 days formation; facilitators, not assigned to specific teams, present only during the 24 H workshop</li> <li>* very clear deliverable: a 3 minutes presentation using slide show</li> </ul>	<ul style="list-style-type: none"> <li>* at the very beginning of the 24 hours</li> <li>* shared by all team members</li> <li>* problems definition defined beforehand by givers (not met)</li> <li>* no explicit reference to creativity, but implicit goal (because of formation)</li> </ul>	<ul style="list-style-type: none"> <li>* CPS (Creative Problem Solving Process) explicitly presented.</li> <li>* theoretical and practical formation to CPS and team building (2 days)</li> <li>* 50% structured (3 milestones but no step-by-step procedure)</li> <li>* 100% autonomy (advisors locally present for short advices)</li> </ul>	<ul style="list-style-type: none"> <li>* drawings, texts ... on sticky notes; 3D CAD modeling</li> <li>* 50% structured (formation)</li> <li>* 100% autonomy</li> </ul>	<ul style="list-style-type: none"> <li>* very short in time</li> <li>* competition pressure</li> <li>* much more «complete» / robust results</li> </ul>
THE CHARRETTE	<ul style="list-style-type: none"> <li>* 30 participants in 5 teams</li> <li>* students (designers), community members, professional designers</li> <li>* modalities free of choice</li> </ul>	<ul style="list-style-type: none"> <li>* 5 days</li> <li>* 5 days of workshop structured by milestones and theoretical talks</li> <li>* team space for the whole workshop, on site dinners (&gt; late working sessions)</li> <li>* 2 Master students, team leaders (with team-leaders checking)</li> <li>* 2 advisors (&gt; advices) sessions (punctual)</li> <li>* very clear deliverables (users scenarios, personas, service map, one video)</li> </ul>	<ul style="list-style-type: none"> <li>* at the beginning of the process</li> <li>* shared by the whole team</li> <li>* not imposed (except for the location), but ideas selection facilitated by the whole group</li> <li>* creative social innovation</li> </ul>	<ul style="list-style-type: none"> <li>* on site visit, street interviews; brainstorming (100 ideas); ideas selection; storyboard; personas; users scenarios, video branding</li> <li>* team building and getting to know each-other</li> <li>* 50% structured (10 milestones but no step-by-step procedures)</li> <li>* 100% autonomy</li> </ul>	<ul style="list-style-type: none"> <li>* drawings, texts ... on sticky notes</li> <li>* not structured</li> <li>100% autonomy</li> </ul>	<ul style="list-style-type: none"> <li>* no explicit reference to CPS...</li> <li>* very strong cohesion and team spirit</li> <li>* interpersonal conflicts</li> <li>* 2 students are team-leaders</li> <li>* slight sense of competition</li> <li>* high pressure during the last 24 hours</li> <li>* purposefulness (social innovation)</li> <li>* great diversity</li> </ul>

## Appendix B - analysis grid of the four workshops

Criteria	Explanation	Scale
Active participation of facilitator(s)  > not considering here the exact definition of his/her roles and tasks, but rather his/her simple presence > only during active and creative moments, not during theoretical nor practical sensitizations	«A facilitator usually is not a part of the group but instead is an outsider who tries to help groups interact in a more efficient manner» Osborn(1957)	Importance of facilitators' presence  (1 really not important - 2 limited importance - 3 neutral - 4 important - 5 very important)
Tools, Techniques and Methods  > not necessarily linked to creativity: could be anything useful for problem definition, needs' definition, ideation, ... > do not refer to physical tools such as sharpies, CAD tools, sticky notes, ...	Examples: * CPS * Brainstorming * field research (interviews, questionnaires, ...) * service map * ...	Process structuration through methods, techniques and tools  (1 really not important - 2 limited importance - 3 neutral - 4 important - 5 very important)
Prescriptive use of <i>creative</i> methods, techniques or tools	* Yes: methods, tools and techniques are imposed and required through application of pre-defined procedure(s) * No: creative "tool-box" available for use but not mandatory	Prescriptive use: yes or no
Overall duration of workshop  > active and creative moments only, when participants actively work on project holder's problem > does not take into account formations, sensitizations (either theoretical or practical if not related to main problem), experts' talks, ...		Number of hours
Regulation	* Roles' Emergence: Yes: roles emerge naturally No: roles do not emerge naturally * Autonomy towards overall process	Yes or no

## Appendix C – visual formulation of results





# “Innovation Marathon” 24 hours of open innovation

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## ABSTRACT

The paper presents the development of an open innovation idea generation event where 55 students worked on real case problems for 11 companies simultaneously during 24hours.

A unique design of massive creative problem solving was applied for the first time in November 2012 in Villach/Austria. Embedded in the biggest innovation congress of Europe with more than 1100 participants the first 24h Innovation Marathon took place. 55 students selected from different disciplines worked simultaneously on 11 real life company problems. The teams were supported by three professional innovation coaches. The goal was to create new solutions within 24 hours nonstop.

This case is an example of open innovation in a very compact way. The eleven companies came from different industries and were different in size. They phrased very different creativity challenges, from hard technical challenges to marketing concepts to business model innovations.

This design, although originally executed as multi-company problem solving event, shows in a very compact way how productive idea creation can be approached completely different and far more effective. Originating from three different organizational backgrounds, the authors aimed to find a suitable project format. The paper shows the development of a successful example.

## KEYWORDS

*open innovation, large scale idea generation, front-end of innovation, creativity*

## INTRODUCTION

To ensure the competitiveness, companies often search for solutions not just within their organization, but also outside the boundaries of the own organization. Whereas internal workshops are relatively easy to organize, it is a huge challenge to include externals in a problem solving process. Especially young, creative minds (e.g. students) who are eager to face the challenge of real problems can contribute in an outstanding way. For companies it is not easy to access the right composition of people on a temporary basis and especially to define a process and organizational framework which creates suitable results. On one hand, a well defined process is necessary; on the other hand enough freedom has to be given to the creative minds in order to ensure radically new approaches.

The following set of goals defined the starting point in the development of “Innovation Marathon”:

- Outcome for the Company:
  - New insights and external views to company-internally defined task or problem (detailed problem analysis, problem-restatement)
  - New ideas (raw-ideas, elaborated ideas, aggregated ideas, concepts)
  - Concepts for solving the defined problem
  - Physical Prototype describing at least one solution
  - Contact to a student team for potential further collaboration
  - Experiencing (not only in theory) an ideal problem solving process
- Outcome for the students:
  - Learning to act in diversified teams, to value other fields of study
  - Experiencing that the combination of team members with different educational background has big value.
  - Experiencing, how important a detailed problem analysis is

- Experiencing, how fruitful early prototyping is
- Experiencing an ideal problem solving process

For the development of the innovation marathon, in addition to practical experiences, the following theoretical approaches were taken into account.

## THEORETICAL BACKGROUND

There are several examples about the fruitful collaboration in the triad of universities, industry and students. Reinikainen (2008) summarized, that

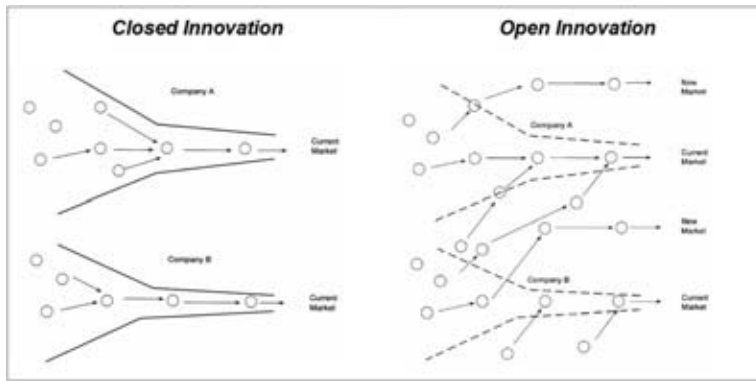
“the exchange of knowledge (and ideas, experience, staff, IPR,...) needs a basis, needs organizational frameworks. It needs infrastructure (“where to meet”), it needs suitable mind settings (“I see that the exchange generates win-win situations”), it needs two-way understanding (“What are your problems and challenges?”), it needs speaking the others` language (“What do you mean by saying...”), it needs knowing about the others` culture (“Is he/she late because he/she does not value my work?”), it needs a legal framework (IPR, liability ...).”

Several principles influenced the development of the “Innovation Marathon” -some of them shall be mentioned in the following chapters:

### ***Open Innovation***

According to literature, in future it is anticipated that research is increasingly multidisciplinary requiring knowledge from a broad range of fields and boundaries of disciplines are important source of new innovations (Korhonen-Yrjänheikki, 2006).

The approach of “open innovation” describes the enterprises’ changed behaviour in dealing with intellectual property, ideas in general and the opportunities of the nowadays widespread distribution of useful knowledge. According to Chesbrough (2006), the classic model of “closed Innovation”, where product and business ideas are mostly developed inside the companies own R&D-departments, the “open innovation” paradigm [...] merges external ideas and knowledge with internal R&D.



**Figure 1 The Knowledge Landscape in the Closed and Open Innovation Paradigm (Chesbrough, 2006)**

The ?Innovation Marathon shall act as one format to provide this necessary framework.

### ***Convergent versus Divergent Thinking***

A very comprehensive description about the importance of different styles in thought processes in creative thinking is provided by Cropley 2006. He describes, that

“creative thinking seems to involve 2 components: the generation of novelty (via divergent thinking) and evaluation of the novelty (via convergent thinking).

In the area of convergent thinking, knowledge is of particular importance: It is a source of ideas, suggests pathways to solutions, and provides criteria of effectiveness and novelty. The way in which the 2 kinds of thinking work together can be understood in terms of thinking styles or of phases in the generation of creative products.

In practical situations, divergent thinking without convergent thinking can cause a variety of problems including reckless change.”

### ***Creative individuals***

When selecting the student teams, we aimed to identify individuals who have already shown that they would suit to participate in the “Innovation Marathon”. We especially focused on references showing that they would be “creative individuals”, shown in at least one of the definition by Amabile (1988) and Sternberg (1988): Creative individuals are people who

- Find their work intrinsically motivating.
- Tend to be independent, unconventional, and more risk-taking.
- Have wide interests and a greater openness to new experiences.
- Have skills in recognizing differences and similarities and making connections.

- Show appreciation of and have ability to write, draw or compose music.
- Show flexibility to change directions.
- Have willingness to question norms and assumptions.

By having the openness to apply to innovation marathon not knowing exactly what to expect a first filtering was already performed.

### ***Education - Problem based Learning***

Innovation Marathon is also following the method of Problem-based Learning, which Savery (2006) defines an “instructional learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.”

“The problem simulations used in problem-based learning must be ill-structured and allow for free inquiry. Problems in the real world are ill-structured (or they would not be problems). A critical skill developed through PBL is the ability to identify the problem and set parameters on the development of a solution. When a problem is well-structured learners are less motivated and less invested in the development of the solution”

### ***A suitable process***

Even if the effectiveness and efficiency of clearly defined processes applied for innovations are questioned in literature (cp. Hauschildt and Salomo 2007), it is useful to describe certain process steps which are necessary and supportive.

Much effort in the preparation of Innovation Marathon was therefore used to develop a process which suits to the variety of tasks.

Two already well defined processes made up the basis:

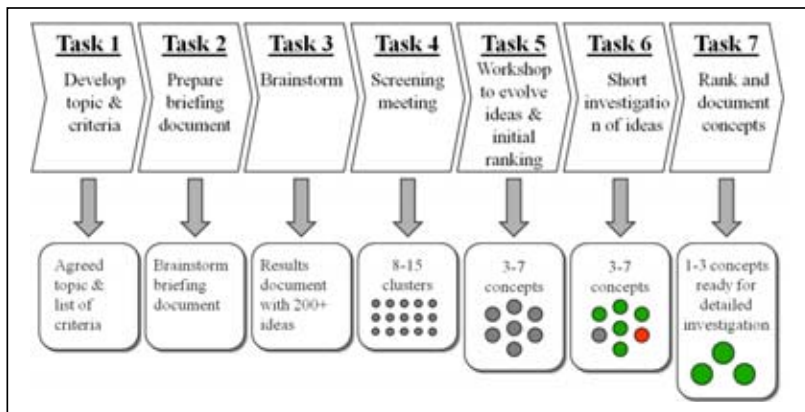
On the one hand the “creative process” in five steps, defined by Wack 1993:

- Problem Phase or The Dissatisfaction - The Problem is recognized
- Exploration or The Exploitation of the Problem - Problem will be analyzed; Information is collected; a new formulation of the problem could be necessary
- Incubation or The Fertilization of Solutions - remove yourself from the Problem; to negate the Problems; making Analogies; break-out from familiar patterns of thinking
- Illumination or The flash of Inspiration - spontaneous solution comes like a serendipity



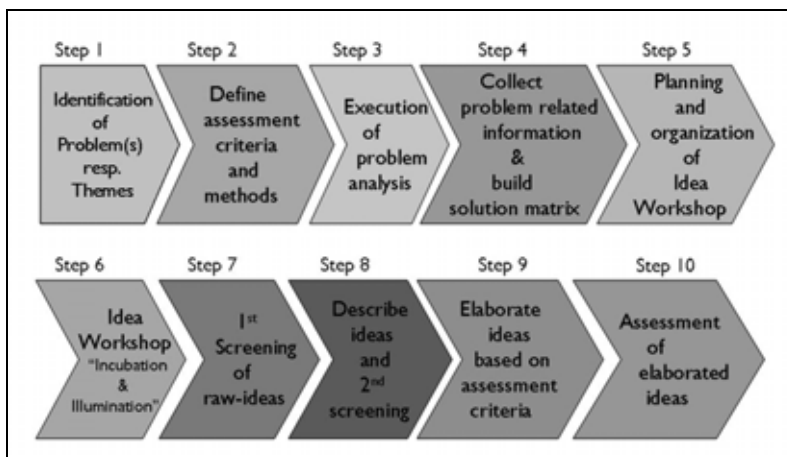
- Elaboration or The hard work - systematical elaboration of ideas and solutions

And on the other hand the Idea-Management-Process described by Rowbotham 1996:



**Figure 2 The Structured Idea Management Process (cp: Rowbotham et al 1996)**

Waldner 2008 combined the two processes, resulting in a ten step process named "Problem-to-solution (P2S)"-process. The P2S process was implemented at Philips Consumer Lifestyle since 2003 (Waldner, Posch 2012) and was the basis for the Innovation Marathon.



**The Problem-to-solution(P2S)-process (cp: Waldner, 2005)**

## METHODOLOGY AND DATA

The question the authors posed themselves was:

- How should a project framework to result in a tangible and sustainable result for the companies and students look like?

Once a format was defined, a pilot project was undertaken to validate the format:

- Does the format provide the expected results for the companies and which changes have to be done in a recurrent execution?

To answer the questions a pilot project was carried out in the framework of Europe's biggest Innovation Congress "Innovationskongress 2012" in Villach, Austria.

The process as well as the results were analyzed and are the basis for the findings and the outlook for further improvement as well as open research questions.

## THE EXECUTION OF "INNNOVATION MARATHON"

This chapter describes how the Innovation Marathon is carried out.

### **Involved parties**

#### ***Innovation coaches***

The three authors acted as coaches and process owners.

They planned the Innovation Marathon, led through the process, supported the teams, initiated necessary activities, motivated, took care of the goal oriented use of resources and were responsible for conflict management. They were not full time moderating individual teams.

#### ***Student teams***

Student teams were carrying out the actual process of Innovation Marathon.

#### ***Company representatives***

The representatives of ten companies defined the project tasks and answered student teams' questions at least at scheduled meetings. Some companies were represented by single persons, whereas others were represented by several individuals.

#### ***Jury***

A jury, consisting of three members of universities as well as industry, was asked to judge the teams in their project execution.

## **Preperation**

In the preparation phase, efforts were focusing on the planning of the process as well as the communication within the stakeholder groups.

### ***Company tasks***

Several weeks before the Innovation Marathon, ten companies and their eleven tasks were selected. After answering a written questionnaire which defined the problem from the company's perspective an one hour interview with the innovation coaches took place. The real underlying problem was explored (divergent process) and a refined task was elaborated (convergent process). After that, the problem description was summarized by the innovation coaches as non experts to ensure a formulation which was understandable by the student team and without company's implicit knowledge. The final task description was formulated in one sentence, additional background information and limitations and was to be confirmed by the company's representatives. The tasks ranged from the development of detailed technical solutions to the development of a brand awareness strategy and included also rather open questions like the development of a "hairdryer of the future".

### ***Team selection***

The student teams members where well selected out of a pool of more than 100 applicants depending on the company task. A team of innovation coaches ensured that for each challenge the team was a good mixture of experts and lateral thinkers. Each team consisted of 5 members, 2 male and 2 female students minimum.

At least one team member was chosen who was not (obviously) educated to provide a solution to the task, even technically oriented tasks were provided with non-technically educated team members. The variety within the almost 100 applicants was surprisingly high and even the selected 55 participants included around 35 different fields of study.

### ***Infrastructure***

The Innovation Marathon was carried out in "Congress Center Villach" in the framework of a two day Innovation Congress with about 1000 visitors. The available space for the Innovation Marathon was about 160m<sup>2</sup>, not including areas for catering and other supporting functions. The technical services of the congress center could be used to set up the needed working environment like tables, chairs, pinboards and especially electrical infrastructure for 60 people.

Only very basic prototyping material such as cardboard, paper, modeling clay etc. was provided to the teams.

## Execution

All participants were asked to arrive the evening before the Innovation Marathon started at the place where it was carried out.

### *Kick-off evening event*

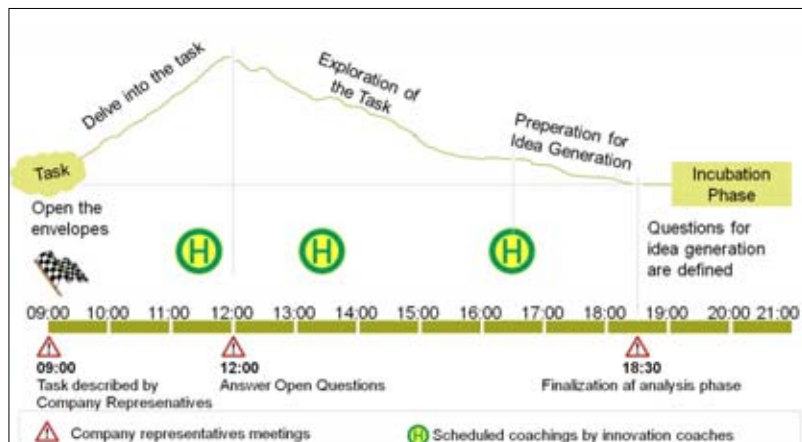
All participants – students, company representatives and innovation coaches – met on the evening before the actual start of the innovation marathon. The complete process of the 24 hours was described as well as the most important rules for creative problem solving.

After the theoretical input, the student groups were formed and a team building practice completed the introductory session.

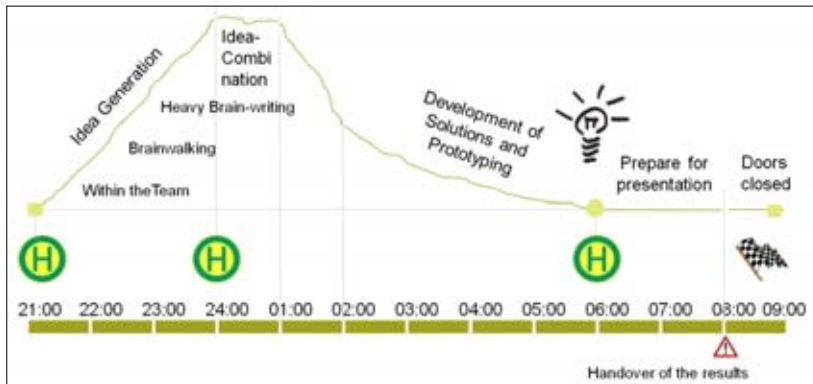
### *The actual Innovation marathon*

The execution of the actual Innovation Marathon started in the morning at 9 am. The teams opened envelopes including the task description. After that, company representatives were asked to discuss the tasks together with the student teams and give the students additional information to gain a holistic overview about the company.

The following two figures shall give a brief overview about the activities during the 24 hours:



**Innovation Marathon part one - focusing on problem analysis**



### Innovation Marathon part two - focusing on solutions and screening

A detailed description of the activities would have exceeded the limitations of this paper and are subject to further publications.

## FINDINGS

The first “Innovation Marathon” acted as a pilot project to learn and further develop the format. It can be said that the results in terms of education as well as in terms of fulfilling the company tasks were very positive. A quantified educational impact of Innovation Marathon cannot be proven at this time and will be subject to further investigations, But there exist results about the companies. As part of the company task an “ideal result after 24 hours of Innovation Marathon” had to be defined by the company representatives. All eleven teams fulfilled or even exceeded the expectations of the company representatives.

At least three companies invited the student teams to further collaborations with them. In several cases, student team members met each other after the Innovation Marathon to work together. In two cases where similar tasks were already executed internally, the student team results were judged of “same or even better quality”. In terms of prototyping the companies’ expectations were more than fulfilled in 9 out of 11 cases.

## CONCLUSION AND OUTLOOK

Our goal was to develop an effective project format, which on one hand combines the strengths of student teams to gain results for the participating companies and on the other hand has an educational goal of showing an effective problem solving process to students and company representatives. Whereas this paper focuses on the development of the project format, a detailed description of the process is not covered yet.

Further research questions concerning the Innovation Marathon should focus on the long term educational impact for students as well as company representatives and the quantitative analysis of team dynamics, motivation factors and refinements of the process.

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# Case: Meeting of Tomorrow - research project

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## ABSTRACT

*HAAGA-HELIA University of Applied Sciences coordinated a project, Meeting of Tomorrow, which investigated how to improve and rescue meetings. Many physical settings in the meeting rooms may support the meeting but the most important part of the meeting is a careful planning. The various intangible and tangible factors form the overall Meeting Design -concept and a specialised person who is able to master in designing sufficient meetings is called a Meeting Designer.*

## KEYWORDS

*Meeting Design, Fixed meeting space, Pop up meetings, User-driven innovation, Living Lab*

## INTRODUCTION

Often employees find that there are unnecessary and inefficient meetings on agenda. There are several tangible and intangible elements that may improve the quality of meetings and boost the overall organizational time management. HAAGA-HELIA University of Applied Sciences (HAAGA-HELIA) tackled this problem by investigating the existing requirements in order to hold an efficient meeting. The outcomes of the project were a Meeting Design service concept as well as a prototype meeting room Griini with a mobile “pop-up” meeting space. Theoretical background of the project based on the concepts of User-driven innovation (= Living Lab) as a method of Co-creation.

## Case: Meeting of Tomorrow –project

In the Meeting of Tomorrow –project the fixed meeting space Griini and the pop up meeting space stood as real life laboratories where the end-users were evaluating the space in their authentic meetings. As an outcome of the



co-creation the Meeting Design – service concept and a spin off enterprise, Re:meet Ltd was created.

The Hotel of Tomorrow – research project (2007 – 2009) investigated future trends of the hotel business. The project team started by defining signals and megatrends which gave an informational and future oriented base to start up a project which outcome was two futuristic hotel rooms that are still functioning in Best Western PLUS Hotel Haaga (Hotel Haaga). (Björkvist 2009.) The second phase of the project (2010 – 2012) The Conference Hotel of Tomorrow -, later on called Meeting of Tomorrow - project, emphasized the meeting cultures and a Meeting Design concept. As a part of the project outcome an innovative prototype meeting room, Griini, was built in Hotel Haaga premises. Griini includes an easily convertible furniture, modern technology such as SMART Board and video conference equipment and, provides an overall pleasant experience for its users. The project was coordinated by HAAGA-HELIA and funded by The Finnish Funding Agency for Technology and Innovation (TEKES) and supported by Helsinki World Design Capital 2012 Fund (WDC). The project partners formed an ecosystem of innovative companies such as Cisco, Quadriga, Aronet, Phillips+Co, and Viking Line.

Similar meeting space to Griini was also created to serve the need for “ad hoc” meetings. The mobile concept has been moved around as a pop up meeting space in several locations.

As a result, the tangible elements of the meeting space were seen vital but not sufficient without the overall service around it. The project analysed and listed several elements how the service can be tied up to the meeting process from the planning phase to the evaluation. There are numerous skills and tasks to be mastered by those who organize the meetings. This lead to an initiative of HAAGA-HELIA and its company partners to design an in-service training programme targeted for those who hold meetings as a part of their job, such as executive assistants. The pilot program will take place in June 2013.

## THEORETICAL BACKGROUND

The terms collaboration and co-creation may be new, but the dynamics they represent are not. Several thousand years back the hunter-gatherers relied on the collaboration and co-creation. (Bhalla 2011:8.) According to Bhalla (2011) the framework for building co-creation capability in companies consists of four interrelated components, which must work together:

Companies need to listen to their customers. Second, they need to meaningfully engage the customers. Third, companies need to respond externally, and finally, respond also internally.

Co-creation must be organized, managed, and facilitated. A group of customers or professionals – their passions, interests, and energy notwithstanding – are the best mere potential for value-creation. In order for this potential to materialise, collaborators need tools and processes to convert their creativity to tangible value. (Bhalla 2011:89.)

According to Bhalla (2011) there are many types of co-creation processes including the following:

- Lead-user design: Collaboration and co-creation fuelled and driven primarily by lead users.
- Contextual/user design: Co-creation relies on processes that incorporate deep ethnography, contextual observation, and the use of prototypes.
- Participatory design: Similar to user design; co-creation emphasizes involving all relevant stakeholders to ensure the end result meets their needs and is usable.
- Empathic design: Similar to user and participant design; co-creation emphasizes observation of the emotional aspects of user-product relationships.
- Crowdsourcing: The crowd or the market is the main contributor to co-creation. (Bhalla 2011:90.)

The meeting of Tomorrow –project emphasized on both – the Contextual/user design and Participatory design by involving a variety of stakeholders as well as authentic end-users in order to ensure the outcomes meet their needs and is user friendly. The project outcomes relied on interviews and participatory observation, and of course, the use of prototype Griini as a real life laboratory.

One way to practise Co-creation is to use User-Driven Innovation methods, also called Living Lab. Living Labs are open innovation environments in real-life settings, in which user-driven innovation is fully integrated within the co-creation process of new services. In recent years Living Labs have become a powerful instrument for efficiently involving the users at all phases of the research, development and innovation process. Concept of Living Lab can serve as a context for open innovation. Therefore it is necessary that the researchers use methods that allow co-creative approach between the consumer and the researcher over the whole development process. (Eriksson, Niitamo, Kulkki 2005; Schumacher and Niitamo 2008;

European Commission 2009; Luotonen ym. 2011; Nyström & Leminen 2011.)

As an example, Denmark has been one of the pioneer countries for practising User-driven innovation. Denmark elevated co-creation to a national priority when it launched the Program for User-driven innovation (UDI) in 2007. This was the world's first government sponsored user-driven innovation programme. (Bhalla 2011:146-147.) In 2009 the Business Innovation Fund was established under the Danish Ministry of Economic and Business Affairs. The Fund is administered by the Danish Enterprise and Construction Authority which is coordinating the tasks of the Programme for user-driven innovation. (Klitkou 2011.)

The Meeting of Tomorrow –project engaged systematically the authentic end-users to innovate and to develop the Meeting Design concept. A great number of meetings were held in the prototype Griini's premises and the users were interviewed and observed by the project team. Also the partnering companies were co-operating in the project. Some companies were research partners, exchanging information and ideas. Some companies provided their products (i.e. technology, textiles, furniture) and were developing the products according to the feedback from the authentic end-users in the real life laboratory Griini.

User-driven products or services require the end-users involvement in the innovation process and that is why the process may take a long time. In the context of Education and Training 2020, through 'A new impetus for European cooperation in Vocational Education and Training to support the Europe 2020 strategy', the European Commission calls for a commitment to enhance creativity, innovation and entrepreneurship. (European Commission, 2010). The Commission is putting forward seven flagship initiatives to catalyse progress under each priority theme, one of them being an "Innovation Union" to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs.

Finland's innovation environment has often been judged to be among the best in the world by the World Economic Forum (WEF), IMD, OECD, Economist Intelligence Unit and others. Finland's dynamic innovation environment and its advanced Living Lab environment have a great deal to offer to international companies. (Public Service 2011.)

User driven innovation methods create successful new concepts, products and services for companies and organisations. By working together with end-users and including them in the innovation process in order to tap

knowledge about their problems and needs, successful and profitable innovations can be developed. User-driven innovation methods can be grouped into four generic categories. There are two dimensions that categorise the four method categories. Users can either be directly or indirectly involved in the innovation process, depending on what questions the company seeks to answer. The knowledge that is being tapped from users, can either be related to acknowledged needs and a clear understanding of what are the problems that the users experiences, or to unacknowledged needs where the user is not aware of what the problem is or cannot communicate it and articulate it. The categories are: User tests, User exploration, User innovation and User participation. An innovation project taking place within a company might use more than one of the four user driven innovation methods throughout the entire innovation process. (Bisgaard 2010)

1. User test:

Getting users to test a product or service is something companies have been doing for decades. This form of testing takes place towards the end of the innovation process. The company has already come up with an idea which has been shaped into a product or a service, and the user or potential customer is brought in once the prototypes have been made to verify whether they would be interested in purchasing it. Based on the feedback from user, the company will make minor adjustments before launching the product or service on the market. Any larger adjustments at such a late stage in the innovation process would be too costly. Therefore, these insights from users will in most cases result in small and incremental innovations.

2. User exploration:

Amongst the approaches that companies and organizations use for identifying the users acknowledged and unacknowledged needs no methods have been more used as an expression for user-driven innovation than user exploration. When working with user exploration users are observed and studied in their everyday setting. One of the most important aspects of exploration of users is to obtain knowledge about users' needs by observing them and thereby tapping tacit knowledge from the users which they are not able to articulate or communicate. Other times user exploration is used in an innovation process as an efficient and relevant tool is the test phase. The purpose is to understand the user's behaviour when he or she acts as he or she always does, in users' authentic lives.

3. User Innovation:

User innovation takes place when companies work closely together with users and involve them as part of the innovation team in certain steps of the innovation processes. The users are actively involved - they can either be experts or advanced users.

#### 4. User Participation:

User participation covers the areas of participatory design and participatory innovation. In user participation companies work together with users and include them in the innovation team to create new ideas. Focus is placed on tapping tacit knowledge from the users which can be used to understand their unacknowledged needs, which the users were not aware they had. Companies seek to tap tacit knowledge from their users by provoking experiences. User participation's purpose is in helping users to think and create opinions that they did not know that they had.

Meeting of Tomorrow project team used a variety of styles in different phases of the project. The end-users are both, directly and indirectly involved in the innovation process, depending on what phase of the project we are looking at. Also the knowledge that was gained from the users was both, related to their acknowledged needs and a clear understanding of what are the problems that the users experiences and to unacknowledged needs where the user is not totally aware of what the problem is. This is because the formal and informal observation and interviews have taken place during many years and in many circumstances, and for different purposes.

In the beginning of the project some brainstorming sessions were held with users, which fit in the category of User innovation. The method of User exploration was commonly used in Griini, as the emphasis was in end-users' observation in a setting of their authentic meetings. Especially at the end of the project also pure User tests were taking place as the prototype Griini was already furnished according to earlier information gained from users.

User participation covers all the main techniques used. The project worked together with the end-users and included them in the innovation processes to create new ideas. Also partly as a coincidence, tacit knowledge and opinions were recruited from users, knowledge and opinions they did not know they had. Sometimes events such as meetings are too close topics and without special techniques the users don't even know what they think of them.

## METHODOLOGY AND DATA

Methods to collect data in authentic meetings and company cases were participative observation, questionnaires and interviews. User-driven innovation (Living Lab) methods were adapted during the project.

Living Lab ecosystem consists on stakeholders forming a “Quadruple helix” that can be further categorized for Users, Utilizers, Developers and Enablers:

Users are in the centre of the Living Lab, using the products or services in their authentic lives. In this project the users were the approximately 700 visitors who used Griini, and the pop up meeting space for their meetings and gave their input to develop the meeting concept.

Utilizers use the information and knowledge that the Living Lab ecosystem creates to strengthen their products or services. In this project the utilizers were the partnering enterprises such as Viking Line, Hotel HAAGA, Aronett and ISKU.

Developers provide their expertise, methods and tools for the Living Lab ecosystem. In this project the main developer was HAAGA-HELIA.

Enablers usually create the general infrastructure and funding to enable the Living Lab to operate. In this project the enablers were TEKES, WDC and Hotel Haaga.

(Heikkanen and Tuomi 2012; Heikkanen and Österberg 2012; Helsinki Living Lab 2013; Ruuska 2013.)

Hotel HAAGA is an interesting example of the project partners. Hotel HAAGA acted as a Utilizer, using the Griini as a laboratory to develop their meeting and catering services simultaneously providing the space which was used to create Griini, which make Hotel HAAGA an Enabler.

Food is a significant part of the meetings. The Meeting Design concept includes an energizing nutrition for the guests. Quite typically the catering consists of sandwich or a sweet bun and a big lunch buffet. The ideal menu, however, is smaller portions many times a day. Instead of high peaks in sugar levels the food should keep it stable. There are many trendy names for such food i.e. brain food, functional food and power food. The Meeting Designer is able to suggest a suitable menu for the meeting including healthy snacks to keep clients brain in creative condition for the whole meeting.

Hotel Haaga co-operated with the Meeting of Tomorrow project team in investigating the nutritional issues and preferences in meetings. As a result Hotel Haaga offers specialised snack menus for meetings organized in the prototype Griini, called Wellbeing Buffets. According to the Hotel Haaga General Manager, Päivi Laine, Wellbeing snack buffet has been a success as a first step to offer something new in meetings. In the beginning a team including hotel managers, meeting facilitators, receptionists as well as catering staff had a brainstorming session to come up with ideas how their clients would benefit the most of the food they eat during the meetings, yet they would need to have an overall pleasant experience. The first product that was created and tested was a Wellbeing breakfast. This was done through so called User exploration. The users (clients) were observed and studied in their authentic meetings. The clients were also interviewed. Later on the menu was developed and it included a snack buffets for “before, during and after meeting.” In 2011 it was quite advanced to offer meeting menus promoting the ideas of organic food, localness, health effects, uplifting and energising qualities, freshness and seasonality. Also Finnish design was brought in by serving the food in Iittala’s Koko dishes, designed by Finnish designers Kristina Riska ja Kati Tuominen-Niittylä. The project team in Hotel Haaga contacted and assigned co-operation deals with some suitable companies such as a local bakery, Haagan Leipomo and Kultasuklaa chocolate factory (Finnish family enterprise). The Haaga bakery for instance provided some rye bread as a take away gift for the Griini meeting clients.

A nutritional expert analysed the menu and pointed out that the sweet snack, local sea buckthorn pie, which was served in the afternoon was not energizing because it was sugary and in the afternoon there is a need for healthier savoury snack. The users, however, liked the sweet pie, so that was kept as an optional choice in the menu. The end-users also criticised the size of the portions being too small and they have been replaced nowadays with bigger portions.

Today, nearly all users of the prototype meeting room Griini order the Wellbeing snack menus in their meetings. Overall the feedback has been positive and encouraging and the concepts are developed accordingly. Hotel Haaga learned to appreciate the value of client feedback even more than before and is now making it easier with some new technology: Hotel HAAGA has invested in mobile applications that the users with a mobile phone can easily provide feedback about the meeting and catering services. Hotel Haaga also pioneered with HAAGA-HELLA by training a student specializing on meeting services (Meeting Designer). This was also a part of

the process to innovate the pilot programme for Meeting Design in-service-training. The pilot programme will take place at the end of May 2013.

The project also had research partners, where the main focus was exchanging information and ideas, such as Viking Line. According to Jaakko Ahti, Product Manager at Viking Line, the co-operation has given them some certainty to include the creative meeting rooms in their ferry boats such as on Viking Grace. Viking Line was participating in the Meeting of Tomorrow project since 2009. The first challenges they faced were ferry boats' strict rules and regulations, especially concerning the safety. The walls cannot be moved and the textiles have to be fireproof etc. Additionally the maintenance costs are very high in also with reference to the meeting spaces.

It was noticed that the demand of meeting rooms and services is still quite conservative. Often the old fashioned meeting rooms with the traditional catering are the most popular ones. However, especially from Sweden and slowly in Finland as well there seem to be the next generation that require trendy meeting rooms – as something 'new and different'. The same people want rooms where they can innovate as well as order a range of smaller and healthier meeting menus. Product Manager Ahti's own opinion is that the trend is very much going to the same direction with the Meeting of Tomorrow –project.

The new ferry boat Viking Grace has got a couple of innovation meeting rooms as an addition to the traditional ones. The innovation rooms are in high demand. The style of meeting menu has been changed and now there is more finger food type of catering available. Although the traditional meeting menus are still the most popular, it seems that the demand is slightly switching towards the modern menus.

Technology in meetings is important but there are some clients wanting to organize their meetings on the ferry, because the technology and internet are not readily available. In fact they might ask the participants to leave phones and laptops out of the meeting space in order to gain the participants full attention.

The project group did Participative observations and interviews on the ferry to find out what the authentic users really want. According to Ahti, the results were useful when considering the meeting processes – i.e. the meeting facilitators on ferry often hold several roles such technology assistant, bar tender, host/hostess etc. Sometimes they have to prioritise their duties and the project helped of seeing the processes more clearly.



To conclude the Viking case, the majority of the end-users want their meeting set up being traditional but after 15 minutes they notice that some other arrangements would be better and they change the room if possible. If there was someone to ask the correct questions and to advice in organising the meeting, perhaps the clients would prefer alternative arrangements for their meetings. Viking Line is already planning to re-new its other ferry boats' meeting rooms for more relaxed direction.

## FINDINGS

The Meeting Design concept consists of several physical and invisible factors. The functional food to keep participants energized all day long, breaks with suitable break activities, appropriate lighting for different occasions, music to create different moods and atmosphere, enable networking by different tools, suitable technology, and ergonomic furniture yet easily movable to set up easily a surrounding for different types of meetings. However, the physical elements do not support the meeting if Meeting Designer is not planning the meetings according to the meeting goals and objectives. Meeting Designer needs to master in organizing the settings so that they serve the needs of the clients. Meeting Designer needs to be able to ask the correct questions to find out the goals and plan accordingly, in some cases facilitate and lead the whole meeting; there are tasks to do before (aims, targets, invitations), during (roles, activating, making sure everyone has their speech) and after the meeting (sum up, feedback). Meeting Designer is specialized for organizing and facilitating meetings. HAAGA-HELIA is currently piloting for Meeting Designer – study programme for those who organize meetings at their work.

## CONCLUSIONS

The Meeting Design is an exciting concept that has gained interest in internationally. If all employers will start paying attention to the quality of their organizational meetings the employees would feel more satisfied and of course it would affect through many aspects for the company results. By invest in the quality of the meetings there may not be a need for as many hours of meetings as before and the time may be used in more valuable ways. Of course, not only a Meeting Designer is responsible but all participants have to carry out their roles and duties. However, a Meeting Designer may be a great asset in managing all the strings that are necessary in a successful meeting.

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# Stretching a Design Technique for Co-creation of Intangible Products and Services

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## ABSTRACT

*When developing a product or a service, it is essential to understand what users need. To achieve this, user involvement methods are used. If different methods are required for each step of the development process, buying this competence from outside or educating employees inside the company can easily become expensive. Many times the shortcut is taken and the one method you know is applied, whether it fits the purpose or not. Another challenge that often arises when involving users in the development process is the differing perceptions of designers and users. In this article we introduce a collaborative physical design technique that comprises free-form physical modeling and model's structured disassembly that appear to provide a way to get to these differences in a quick, fun, visual, and indicative way. Through three real-life cases of intangible products and services we demonstrate how this design technique is stretched and used in situations from analyzing an existing concept to creating new ones. Our attempt is also to explain what is gained and what is lost in the process.*

## KEYWORDS

*Collaborative design, physical modeling, intangible products and services*

## INTRODUCTION

When developing a product or a service, it is essential to understand what users need and desire. To achieve this, users can be involved in the development process in numerous ways. Despite the availability of methods

there are challenges: In order to get the most out of a method, one must master it. And if different methods are required for each step of the development process, buying this competence from outside or educating employees inside the company can easily become expensive. Often the shortcut that is taken is to apply the one method you know and then hope it fits the purpose. Focus groups (Higginbotham & Cox 1979; Krueger 1988) for example have become an all-round method that is stretched to cover situations when not really applicable. Focus groups serve their purpose when there is an existing product that can be discussed, but for developing and evaluating new product ideas it is not the right tool (Fern 1982; Zaltman 2003).

A large amount of available methods is rooted in the development of physical products. The intangibility of services, on the other hand, can become problematic in the development process. It is known that a physical object can help to bridge the boundaries (Leonard-Barton 1995), and prototypes and visualizations have their role as thinking and communication tools (Brandt 2007; Ward et al. 2009). Physical representations of various kinds have long been used in supporting different design activities (Pei et al. 2010). Prototype is a common example of physical representations and in its most traditional form a demonstrative vehicle for sharing and experimenting visions. While the majority of user involvement with prototypes once concentrated on users evaluating prototypes, Bødker & Grønbaek (1991) emphasize on the possibilities of using prototypes in stimulating user participation in the design process, calling it *cooperative prototyping*. Using low fidelity prototypes i.e. mock-ups to represent a feature without any functionality can further lower the threshold for user participation as according to Ehn & Kyng (1991) mock-ups encourage hands-on experience and are understandable, cheap, and fun to work with. In the literature on business models that are intangible by nature, there are examples of physical models or aids being used in engaging people in the innovation process (e.g. Osterwalder & Pigneur 2010; den Ouden & Valkenburg 2011; Lübke 2011; Buur et al. 2013). According to design theory, designers solve problems incrementally by creating explicit design representations that “talk back” to the designer (Schön 1983). Ostwald (1995) explains that collaborative problem solving theory suggests that people construct and maintain an understanding through dialog, in which meanings are accrued incrementally, along with evidence of what has been understood so far. These are good grounds for seeking a way to bring tangibility into the development of intangible products and services.

The challenge that often arises when involving users in the development process is the differing perceptions of designers and users. Concretizing these differences becomes even more problematic in the case of intangible products and services. In this article we introduce a collaborative physical design technique we call CPM that comprises free-form physical modeling and model's structured disassembly that appear to provide a way to get to these differences in a quick, fun, visual, and indicative way. Through three real-life cases of intangible products and services we demonstrate how this design technique is stretched and used in situations from analyzing an existing concept to creating new ones. Our attempt is also to explain what is gained and what is lost in the process.

## COLLABORATIVE PHYSICAL MODELING (CPM)

### **Background**

The first version of Collaborative Physical Modeling (CPM) was originally improvised to meet a need in a redesign project for Finland's national public service broadcasting company (Yle) teachers' web service "Opettaja.tv": We needed a tool for revealing what elements comprise the current/existing service for stakeholder groups. Loose inspiration was taken from various well-known methods and approaches used in the design of products and systems, such as participatory design (cf. Schuler & Namioka, 1993), the design game (Buur & Matthews 2008), reverse engineering (e.g. Otto & Wood, 2001), and the affinity diagraming (e.g. Beyer & Holtzblatt, 1999; Otto & Wood, 2001).

In the following, we present the basic idea of the CPM through its process flow. CPM requires 3–5 participants from same stakeholder group for one session that lasts 2–3 hours. We have used two facilitators to ensure the flow and documentation of the process.

### **Flow of the technique**

#### ***Preparation***

Preparing the setting for CPM is ensuring a table and a wall with plain surfaces, chairs, plain paper sheets, and an accessory kit (see Figure 1). Recording requires still camera, audio recorders (and possible video recorders), and note-taking equipment. Facilitator roles in CPM are typical to workshops and tests, in Snyder's terms "flight attendant, sports caster, lab scientist" (Snyder 2003; Schuler & Namioka 1993, 263).

### ***Warm-Up***

CPM begins by introductions and explaining the steps of the process. The first step is warm-up drawing and ideation to get people to loosen up and accustomed to voicing, tangibilizing, and sharing ideas in a quick pace. We have used warm-up exercises, where participants have to generate ideas fast first individually and then collaboratively, having to also build on each other's ideas.

### ***Model Building***

After the warm-up, the accessory kit (see Figure 1) is brought to the table and divided evenly in a way that allows all the participants to reach everything. The participants are then asked to build a model of the concept in question in physical 3D format using the available materials. Facilitator emphasizes that all solutions are good and artistic beauty is not a target. Participants are encouraged to "get their hands dirty", and the only physical limits are set by the dimensions of the table. We have advised them to think of an element of the product they want to construct out of the given materials, rather than thinking about what they could create out of the available materials. In some sessions participants have written a name for each element, and we have found this excellent, but this is not required. Modeling lasts from 60 to 90 minutes depending on the nature and complexity of the product in focus and how participants work. When the model is ready participants are asked to briefly present its main elements.



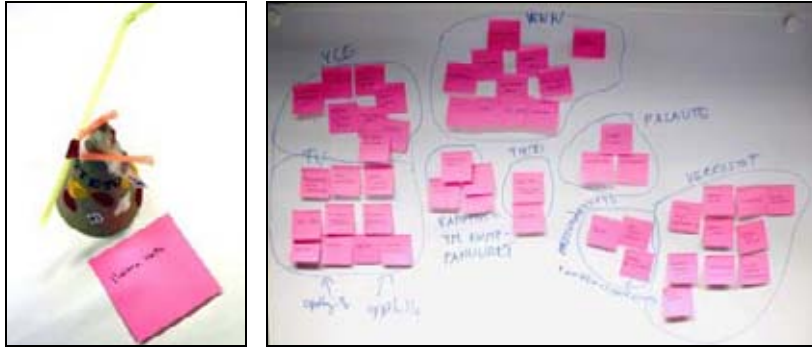
**Figure 1** The accessory kit (*left*). Model building under way (*right*).

### ***Disassembling***

The participants are then asked to remove and identify the elements, one by one. Facilitators write element labels on separate post-it notes (which all should be of the same color, see Figure 2), photograph each element and collect them on the white board in consecutive order. This continues until every element has been labeled and there is nothing left of the model.

### Grouping

The last phase requiring participants is that they group the post it elements on the wall according to affinity into entities and give a name to every entity (see Figure 2). Resulting entities represent the main components of which the whole product consists – as perceived by the participants.



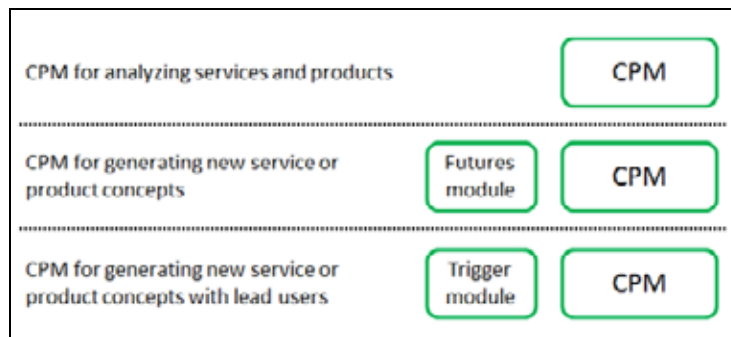
**Figure 2** Element removed from the model and labeled (*left*). Elements grouped into entities (*right*).

### Analysis

The analysis of results can take many forms. The quickest way is to visually inspect the grouped elements of a workshop as well as to compare visually grouped elements from different workshops. A more detailed view of comparing workshop results is to list elements and groupings and form ordered pairs (see below). Documenting CPM in audio, video and still pictures also allows for full transcript based interaction analysis either in total or in selected parts. For design project purposes this latter option is mostly too laborious.

### STRETCHING THE CPM TECHNIQUE

Next, we present how the CPM technique is used in three different settings. The architecture of the settings is presented in Figure 3.



**Figure 3** Architecture of different settings.



## CPM for analyzing intangible services and products

In the redesign project of the teachers' web service Opettaja.tv CPM was applied in order to learn *how the present web service is perceived by its users and designers*. Three CPM workshops were consequently organized: our pilot one with three young teachers, one with four experienced teachers, and one with four designers.

The differences in designer and user constructions of Opettaja.tv were approximated by comparing in ordered pairs the overlaps and level of detail in elements of the models. We used an approach similar to analyzing free list data by focusing to co-occurrences of items (Borgatti 1998). Instead of identifying elements based on their co-occurrences when mentioned together, we used pairing to find direct overlaps and used groups created by participants and our knowledge of the service as a basis for closeness and extended pairing. For instance, experienced teachers mentioned Yle (Finland's national public service broadcasting company) as an element while designers listed detailed elements comprising a group they called Yle (see Figure 4). Experienced teachers had one more detailed element about Yle, *administration*, which was paired with designers' element *Yle bureaucracy* as a direct overlap and all designers' detailed Yle elements were included when counting extended overlaps for experienced teachers' Yle element.

PAIRS AND PAIRS BY EXTENSION			
Group	Designers Element	Experienced Teachers Element	Group
Yle	Isä Paja	Administration	Institutions
Yle	Bureaucracy of Yle		Institutions
Yle	Fritorial staff		
Yle	Members of editorial staff		
Yle	Tooma TV channel		
Yle	Cooperation of editorial staff		
Yle	International joint projects		
Yle	Digital media		
WWW	Assignments	Assignments	Features
WWW	Video	Videos	Materials
TV	Pupils	Different learners	Learners
		Weaker	Learners
		Stronger	Learners
		Auxiliary learner	Learners
		Learns by doing	Learners
		Special needs possible	Learners
		Visual learner	Learners
		Logical learner	Learners
		Intuitive learner	Learners
		Contextual learning	Learners

**Figure 4** Paired comparison of elements and groups in designers' and experienced teachers' models (only a short section of a complete list).

Another example of differences in orientation was the fact that designers very quickly in the beginning concluded that the students (represented by wooden pawns) should be excluded from the model: "*Pupils have no role in Opettaja.tv. They are not part of it.*" However, as the workshop progressed, pupils re-emerged in the model in two peripheral locations made out of

play dough. In both user models, students were brought to the table right in the beginning and they held a central location in the model. Similar detailed attention to learning and teaching settings is evidenced in the long list of problems and suggestions for improvements which the experienced teachers listed in regard to Opettaja.tv, entirely missing in the designers' and teacher students' versions.

The tangibility of CPM technique proved inspiring and engaging, and most importantly, capable of demonstrating the differing perceptions of users and designers.

### **CPM for generating new service or product concepts**

Once CPM had proved useful when analyzing a complex and intangible service, the next logical step was to apply it when generating new service or product concepts.

In a project with a medium-sized Finnish insurance company, we had a chance to run a CPM workshop both with company representatives ("designers") and customers ("users") with a focus on creating a totally new service: *next generation health insurance*. The foresighted time perspective was 15 years.

We very quickly realized that a group of people cannot start generating a physical model of a new service concept for the future from scratch, so we decided to add **a futures module** in the beginning of CPM (see Figure 3). The participants were given 12 tangible trend cards that we had prepared beforehand and that described possible development directions in the area of health care. Each card included the trend title and an image describing the trend, for example 'customized pharmaceuticals and treatments', 'superfood and functional food products', and 'pandemics'. The participants were also provided with two blank cards that they could use if they found a relevant trend missing. The process was started with a free-floating discussion about the trends, after which the participants had to select three trend cards that they considered the most interesting and important for the future of the health insurance services. The trends provided a starting point for the second part of the workshop: the CPM.

The designers' model of the next generation health insurance consisted of 23 elements that formed 7 entities. In the users' model there were 30 elements forming 5 entities. We started analyzing the models by organizing the elements into pairs as was done in the case of Opettaja.tv (see Figure 4). This ended in problems almost immediately – we were able to spot only two pairs. Why was this different from our experience with Opettaja.tv? It is visible through the elements that both groups have

touched the same themes (the role of the customer, physical and mental wellbeing, family and social networks, declining years, for instance) but as they were generating a novel concept, the level of abstraction took off in various directions making the element pairing impossible. Very shortly after the beginning of physical modeling, both groups also started generating their own vocabulary for the features in their health insurance concept, which made the pairing of elements even more difficult.

The differences in the concepts are still visible, although not as quantitative as in the case of Opettaja.tv. For example, the degree of commitment was seen in a very different way in the two concepts. In the users' concept, the insurance was "a missing piece" in the users' health-related social network and the network was controlled and managed by the users themselves. The company representatives built a concept in which insurance users were members of a network controlled by the company. They created an insurance membership community which required commitment from the users. Also, following what we already saw in the case of Opettaja.tv, the company experts spelled out richly the features and organizational issues surrounding the health insurance concept, when the users concentrated in the overall experience of the health insurance user. Two of the five entities that formed the users' model dealt with using the service – in the designers' model only one of the seven.

### **CPM for generating new service or product concepts with lead users**

We have also used CPM in a lead user workshop. Lead user are users that currently experience needs still unknown to the public and who also benefit greatly if they obtain a solution to these needs (von Hippel 1986; von Hippel 2005). When developing a solution with the lead user method (Urban & von Hippel 1988; Lüthje & Herstatt 2004; Churchill et al. 2009), the lead user workshop is the final step. The goal of the workshop is to transfer the lead user knowledge and solutions to the company. The redesign project of Opettaja.tv was realized with the help of lead users, and in the CPM workshop we had five lead users generating *a novel concept of an ideal online service for supporting learning*. Since lead users "live in the future" relative to representative target-market users, experiencing today what representative users will experience months or years later (Lilien et al. 2002, 1044), a futures module was not needed in the beginning of CPM. One could say that when it comes to lead users, the futures component is built-in. In place of a futures module, we gave the participants 19 tangible **trigger cards** (see Figure 3) representing concepts related to teaching and learning, such as 'social media', 'learning from peers', 'curriculum',

'homework'. The participants were also given two blank cards. After discussing the cards for approximately 30 minutes, the lead user participants were advised to choose 3–5 cards and use those as starting points for the following CPM.

The lead users' model consisted of 24 elements that formed 6 entities. Functionalities and using the service were emphasized in the model, as could also be expected according to lead user literature (e.g. von Hippel 2005). What is notable compared to our first case, where users and designers were analyzing the existing web service, lead users did not separate teachers and students but used an umbrella term 'users' including teachers, students, and also parents of the students.

## DISCUSSION AND CONCLUSIONS

Bringing tangibility into the intangible seems to hold advantages: Having to give a concrete form to each thought and idea supports participants' attempt to construct and maintain a shared conception of a problem. The relationships between different elements in the 3D model are easy to perceive and modify, and since everybody's ideas are being physically and simultaneously developed, ideas do not vanish or drift away as commonly occurs in workshops. The fact that each element of the model looks different is a strength. If we did the same with just sticky notes, keeping track of the whole would require reading through the identical-looking notes over and over again thus slowing down the process. The nature of the materials being common arts and crafts materials many of us have used as a child also makes the barrier to start modeling very low and probably also helps to move away from "office mentality" that can chain one's imagination and creativity.

We saw that CPM appears to bring to the fore substantial differences in how designers and users perceive an intangible service. In particular it is of interest that the technique appeared to spell out the richness in each group's primary orientation and concern, in activity theoretical terms the "object" of their work (Engeström & Escalante 1996; Kuutti 1996). When it comes to the case of analyzing the existing Opettaja.tv web service, in both built models as well as in the flow of discussion in the transcript, designers spelled out richly the features and organizational issues surrounding the service, but glossed over "pupil". Users (teachers) described in rich detail "learners" and organized their models around learner–teacher relations. This recapitulates the core message that comes across from activity theoretical studies on developer–user relations: making a transition from

developer orientation to user orientation is crucial for technology projects' success as developer priorities tend to override those of users (Engeström & Escalante 1996; Hasu 2001).

In our cases, we stretched the CPM technique to cover three different types of design situations: 1. analyzing an existing service, 2. generating a novel service concept, and 3. generating a novel service concept with lead users. Moving from analyzing to generating, the technique had to be enhanced with a pre-module: a futures module in the case of designers and "ordinary" users, and a trigger module in the case of lead users. Even though the difference in stakeholder perceptions remained similar through the first two cases, the shift from analyzing to generating changed the level of abstraction and caused some loss of detail. When disassembling the physical model into elements, it is the facilitators' job to ask for wordier element labels in order to reveal more detailed meanings of the elements and for the technique to remain self-documenting. Otherwise making sense of the newly generated vocabulary requires going through the audio recordings.

When we compare the outcome of the two cases where CPM was used for generating a new concept (cases 2. and 3.), an unexpected observation was made: In the lead user case collaboration and building on each other's ideas decreased. Unlike in the case of designers and "ordinary" users, the lead users seemed to keep things more to themselves. Even though the amount of talk remained more or less the same, the content shifted from collaborative to more self-promoting. The lead users really pushed their own agenda and paid not that much interest in the next person's ideas. However, this observation supports what is characteristic to lead users as presented in the literature: Their current need not being met by the products and services on the market and the severe nature of this need may have led lead users to create their own solutions to the problem. We are prone to think that this might create a feeling of empowerment and perhaps an impression that you can't be helped. For us the next step would be to think what kind of stretching of CPM should be made that would facilitate working with lead users.

Collaborative physical modeling (CPM) is a technique that with relatively small modifications can be stretched to be used in several design situations. Our three cases demonstrate how the variation in the intent of the workshop and the characteristics of its participants affect the outcome.

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# Co-design of products enhancing energy-responsible practices among users

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*How to design products that may influence users towards new and more sustainable behaviours? Beyond the eco-efficiency of domestic equipments, is it possible to think them so that they suggest to their users they should be used in a thrifty way? The paper presents a 6 months co-design session within ISEU (Integration of Standardisation, Ecodesign and Users in energy using products) research project funded by the Belgian Science Policy. It describes the collaboration with families, the tools and interactions used to ensure their involvement, the participative design sessions to define together with design teams, innovative design strategies and related sets of new domestic equipments. In particular, it focuses on computers, one of the four categories of appliances studied and explores possible redesign based on rethinking the default settings in order to induce more energy-responsible practices in households*

## KEYWORDS

*energy responsible; user centred; domestic appliances*

## 1. INTRODUCTION: DESIGNING PRACTICES

In the search for more sustainable consumption patterns, “behaviour change” has become a motto. A usual way to deal with this aim is the idea to change first attitudes of consumers, so that a behaviour change will follow. There is however more and more research showing that *practices* are not changing so easily, especially when consumption is inconspicuous as it is the case of household energy consumption (Shove 2003, Jackson 2005). From the point of view of design much of the political agenda is on *ecodesign*. According to the directive 2005/32/EC “establishing a framework for the setting of ecodesign requirements for energy-using products” (EuP), ecodesign means: the integration of environmental



aspects into product design with the aim of improving the environmental performance of the EuP throughout its whole life cycle”.

As our research has shown, the preparatory studies for implementing the ‘ecodesign directive’ are mainly based on technological considerations; uses and users are hardly considered (Wallenborn & al. 2009). Besides the necessary energy efficiency improvements, the question of sufficiency is never asked. Though efficiency and sufficiency are generally considered as opposite concepts and strategies, we think we have to make them complementary. Indeed we ought to combine acceptable additional efforts for the users (sufficiency) with improved usage process (efficiency) and explore how to ‘do nearly the same with less’.

Manzini (2009) pleads for a design that would overcome the pitfalls of eco-efficiency and those of the individual choice as a sustainable solution. But how could design start from households’ practices? How to design products that may influence users towards new and more sustainable practices? Beyond the eco-efficiency of domestic equipments, is it possible to think them so that they suggest to their users they should be used in a thrifty way? Design generally pushes consumption and tends to be part of the problem: how to use the same design skills to enable households to shift their practices more in line with a sufficiency principle? How could new interfaces empower user rather than making them impotent?

What are they able to create as new device enhancing changes in user energy saving behaviour? This is the starting question of the present paper. We will present some results of the collaborative sessions with households, centred on 4 household appliance categories: lighting, heating regulation, washing machine, computer. These co-design sessions with users lasted 6 months and were conducted by Strategic Design Scenarios and Égérie Research, Belgium. Families were invited to collaborate and to participate to design sessions to define together with design teams, innovative design strategies and related sets of domestic appliances likely to induce energy-saving practices. The first part of the paper presents the collaborative work with the users, the tools and interactions used to ensure their involvement in the design process. The second part describes the results obtained at a methodological level proposing four design guidelines to engender energy-saving practices.

## 2. COLLABORATIVE DESIGN WITH USERS

The co-design sessions with users has been developed during 6 months in four phases starting with online discussion with 16 families, discussing their energy consumption patterns, exchanging pictures of their living contexts and progressively building trust. This first phase aimed at selecting 'friendly users' which value is less in their testing capabilities and market representativeness than in their willingness to design a supportive environment toward new and more sustainable way of living (Snyder 2003, Sanders & Stapper 2008, Jégou 2009). The second phase of immersions at their homes, in households' life, allow empathy with the users (Evans, Burns and Barrett, 2002). The third phase has invited the families to work together with design teams at Strategic Design Scenarios offices and to co-design new product concepts. Finally the fourth phase consists in delivering to the families, mock-ups of the products they co-designed, makes them familiarise with these new equipments in their homes, and asks them to describe why they think these new appliances are likely to improve their energy-consumption practices in front of a video camera. The short video clips of users presenting their involvement in a design process, the results they obtained and the behaviours changes they expect will feed the following of the ISEU research project, in particular to stimulate qualitative discussions with larger samples of users as well as designers and producers of domestic appliance. Only the third and fourth steps of the co-design process will be presented here.



**Figure 1. The first 2 phase of the co-design with users consist in building trust with them and ensuring their willingness to explore their own way of living and interact with the design team.**

### 3. PLAYING DESIGN GAMES

The third phase of the participative design with the families consists in proposing them to take part to some of the design projects they contribute to trigger in the previous phases. The proposed context is completely different: families were no more in their domestic environment. Two families were invited for an evening in a design consultancy at Strategic Design Scenarios offices. Learning from the previous steps is shared with them and 2 design exercises are proposed lasting about one hour each.

The lessons learn in the 2 previous phases tend to suggest that energy consumption issues of the computer doesn't seems to be an issue.

The trend shows clearly a multiplication of the computers per household and even per individuals (i.e. Mini-PC, TV-PC, tablets, etc.) with consequences in terms of energy. But compared to the other domestic equipment considered in the research, the computer consumes much less energy during usage and therefore is not perceived as a main problem in terms of energy consumption.

The computer is the most so to say intelligent equipment of the household and users tend to think that the self-management of the energy consumption by the computer itself would be more desirable than an implication of the users in this task. On top of that, computer-based activities in the household (gaming, browsing the Internet, writing, etc.) tends to be cognitively involving, therefore users are even less available to consider during these periods side questions such as energy management.

The issue of sparing the battery on portable devices is key enough on the market to pretend that competitors have maximised hardware and software parts to reduce the energy consumption. The diffusion of these solutions appears therefore likely to reduce the issue of energy consumption of any other computer-like domestic devices.

Based on these considerations emerging from the first steps of user study, the computer is perceived as both more and more intelligent and less and less material and tends to acquire a specific status for the users: the

category of computer-like objects is expected to take care of it-self, to show a (partial) autonomy. Reduction of energy consumption should be therefore self-managed by the device. Beyond direct consumption management, users infer also a certain capability of computers to influence positively indirect consumption. Information and communication technologies-based objects are perceived as objects quasi-subjects (Manzini, 1989). Within sustainable development transition, they are expected to help users in daily tasks, to support them, to raise their awareness and to educate them.

Within this framework hypothesis, the research proposed to consider computers and computer-like objects in the domestic environment for what they could be *energy eco-conscious* objects: objects able to manage and reduce their own energy consumption and the consumption of other objects related to them or in their direct surroundings.

An anthropomorphic metaphor of this concept could be a group of kids where the older is given always the responsibility to watch the others. In the same intuitive way, in the population of domestic objects, it is expected that the more sophisticated take in charge less elaborated ones with which it relates.

This hypothesis of research will be considered at two levels: first locally computer-like devices should manage their own consumption (i.e. processor, hard-disk management, etc.), the peripheral directly connected (i.e. on/off management, standby modes, etc.) and also help users to regulate their practices (i.e. time of use, type of activities, etc.) and raise awareness of indirect consumptions (i.e. consumption due to the use of search engine and connection to remote servers).

At a second level computer-like devices and household ICT beyond their direct usage, may be involved and involve users in the management of energy consumption of interrelated systems they are connected to: a computer operating in the domestic environment involves in the rational use of energy in the house; intelligent domestic appliances support energy management in the kitchen, etc.

## Computer managing energy consumption of peripheral devices

The first design exercise investigates the first level described above where the computer is promoting rational use of energy in all every tasks it supports. The computer would analyses permanently the different flux of energy in use, tracks wastes and suggests measures to be taken. But quasi-subject objects tend to interfere with users and sometimes tends to bother them in their usage (i.e. refrigerator ringing when the door is left open too long; car's sits alarm forcing users to put their belt on; software prompting tips each time they are launched, etc.).

Key-questions are then: when and how should the energy eco-conscious computer interact with users? Why these interactions will be perceived positively or disturbing? Under which conditions these interactions may induce shifts in users practices?

The first interaction exercise will therefore investigate these questions. The setting of the interaction proposed to the participating users is based on:

- The hypothesis of a computer connected with a series of peripheral devices: A4 printer; photo printer; scanner; external hard-disk; loud speakers; etc. through a multiple socket controlled by the computer and allowing it to turn on and off the different devices;
- A series of computer screen-prints showing different situations where the computer proposes an interaction focusing energy management.

Three series of three screens are proposed focussing different topical moments of the usage of the computer and its peripherals:

- The moment of the initial installation and configuration of the peripheral to the computer chosen as a key moment to inform on the energy consumption as part of the different technical characteristics of the connected devices (i.e. which device is consuming what, when, etc.);
- When the users consciously ask for the use of a particular connected device and therefore dedicate some attention to this interaction (i.e. the printing command opens a window showing the different printer settings: paper size, quality, ink level and also costs of different colours options, number of pages printed monthly, average use comparisons, etc.);

- When the energy consumption is particularly high compared to the average and it is worth attracting users attention and disturb then in their practice (i.e. peripheral are on but have not been used for a moment and are not relating to the on-going task).

For each of these different emblematic situations of use three different patterns of interaction design are proposed on the screen-prints examples:

- An informative mode: the computer is an *expert* that gives information and teaches the users about energy consumption;
- A coercive mode: the computer is a *policeman* that obliges users to consider energy consumption issues;
- A suggestive mode: the computer is a *friend* that delivers an optional advice on energy consumption.

The interaction with the users is organized as an informal discussion (Figure 2) including presentation of the different proposition, spontaneous reactions of the group, review of opportunities and barriers, negotiation between the different participants to reach an agreement in term of interaction design of energy management.



**Figure 2. Design exercise focussing different computer interaction modes to prompt user attention to energy management and shift of its own practices. Different screen prints picturing different moment on interaction with the computer and various postures/patterns of interaction design are presented to the group, reviewed, classified and a common strategy is agreed.**

The main learning from this exercise shows that the *energy eco-conscious* design concept seems to be pertinent for user and in particular

materialising through an explicit multiple socket allowing the computer to control the set of devices it is connected to. This interest should be moderated by the fact already mentioned that ICT is not perceived as an issue in terms of energy consumption.

Some guidelines emerged in terms of user-computer interaction design:

- *Eco-conscious* objects should reduce cognitive saturation of users. The key moments for that are the initial installation of the devices and when users are explicitly requesting their use (spontaneous interruptions should be banned). Configuration of the connected devices is the right moment to set interaction rules including on energy consumption (i.e. predefined consumption targets; on-off management rules; etc.) so that the multiple devices can afterward work in a (more) autonomous way reducing the cognitive overload of the users;
- *Eco-conscious* objects should be highly customizable in particular in term of energy management to match what users retains as pertinent for them. A redundant choice between statistics, indicators, interactive displays, etc. should allow the family to build progressively its own most efficient but still socially acceptable levels of energy self-management by the computer, user capability to interfere in the process, social norm and mutual control within the family.

### **Computer as energy interface of the household**

The second design exercise relates to the second level of the research hypothesis where the *energy eco-conscious* computer goes beyond the devices directly connected to it in order to interact with the whole domestic environment. This enlarged hypothesis of research matches the broader problematic of *smart metering* and the gathering and analysis of energy consumption data and its potential to induce changes of user energy practices.

The key-questions to explore are then: what kind of interaction with an *eco-conscious* computer able to manage energy consumption of the house? How should data be aggregated and presented to attract interest of the family and induce long lasting practices changes?

A series of assumptions could be inferred from the two previous investigation steps of the research. In particular the technical infrastructure

of energy distribution in the household is not the best model to make sense for the users and present them pertinent information on their consumption. Certain energy sources may be technically separated but perceived as aggregated in terms of user's benefit (i.e. read a book is based on both adequate heat and comfortable lighting). On the contrary, the energy consumption may have very different significations in term of usage along the day (i.e. the same living room ICT may be work at certain moment and entertainment just after). Finally, the perceived benefit tends to be dissociated from the intensity of consumption (i.e. in the previous example of reading a book, lighting is perceived as important in terms of comfort as the heating even if the second is consuming much more energy than the first).

Three different aggregations of consumption data could be more significant for the users than consumption data of single appliances :

Showing energy consumption per room of the living space (i.e. what does the small bathroom consume compared to the larger one?);

Showing the energy consumption organized according the different functions of the household (i.e. does preparing a meal for four people consume twice preparing it for two people?);

Showing the energy consumption of the different family members (i.e. does parents consume more than the children?).

This hypothesis of data aggregations may be completed with other ones and in particular with more pertinent mix (i.e. clothing care of the kids; thermal comfort in the bedrooms).

In parallel two phases appear distinctively in the interaction between the energy consumption data and the household:

The initial phase of installation and diagnosis of current consumption patterns. It's generally of moment of discovery of the family energy practices and of high interest of the family members for this news type of self-investigation. Shortly after these data are available the strengths and weaknesses of energy use practices emerge showing potential areas of economy in the household. In particular, easy changes appear either because they relate to technical issues (i.e; standby consumptions; low efficiency old appliances; etc.) or because they don't request important behaviour changes (i.e. misinformation on what consume more and less;



old habits that were not revisited; easy substitutions with same perceived benefit; etc.).

After this starting phase characterized by self-diagnosis excitement and relative easy energy consumption reduction discovery, a second period opens not limited in time where initial interest for 'waste hunting' is passed. More challenging practices changes need to be faced in order to further optimize the household consumption either because technical improvements requires financial investments in new and more efficient appliances or because practices questioned are more touchy in terms of behaviour changes for the family members. This period is characterized by efforts and good resolutions but also drawbacks and return to former practices. The household may try and blend strategies to reach practices changes such as setting self-challenges, focussing highest consumptions only or involving in user communities and more holistic lifestyles changes processes.

Practically these different options of data aggregation and periods of change were materialised in the second interaction with users (Figure 3). A series of cards featuring different screens of the household energy consumption data was made available asking participants to analyse it browsing through the different aggregations per rooms, functions and family members. Spontaneous use of the different cards was observed and participants were asked to voice their analysis process. After this first exercise reflecting the diagnosis phase, participants were ask to propose actions for further energy consumption reduction using the same cards plus three more series showing:

Different ways the energy metering system may display or prompt the data (i.e. detailed monthly bill; mails; sms; collective website; etc.);

Different possibilities to self-limit the energy consumption (i.e. by day; by function; per family members; etc.);

Different options to share experiences and exchange advices collectively (i.e. chat with peers; user communities; etc.).

A second round of discussion took place with the aim to generate agreement between the participants in terms of measure, actions the household could adopt to reduce its energy consumption and the how to best implement them.



**Figure 3. Design exercise focussing the extension of an *energy eco-conscious* computer to the energy management of the entire household. Cards representing different aggregations of energy metering data per places, function and people feature the possible interface of the household energy metering system. Participants are prompted to use these data and interact to detect and agree strategies to reduce the energy consumption of the family.**

Lessons learned from the second exercise on the energy metering data show a spontaneous interest and use in aggregation by function and places: participants used them and spotted relatively quickly in a first diagnosis where the over consumption were and used these information to elaborate strategies of changes in the family energy use practices. On the contrary they were very reluctant to use data aggregated per household members not so much because these aggregations were not pertinent but rather because they were likely to activate the already existing tensions in the family between single consumption patterns.

Unexpectedly if reluctant to compare within the family, participants showed a great interest in exchanging with peers. As far as these comparisons are pertinent (households that are effectively comparable) and transparent (data are reciprocally shared and open) dialogue with other families may help to better interpret proper data and orient changes. They ask for informal and vivid exchanges that may both give advices, tips and appeal to change. Beyond this interest and trust to peer-to-peer modes, the participants request the co-creation of a missing social norm that may help to provide references and regulate their own household practices.

As already noticed in the lessons learn from the first exercise, participants showed a particular interest in forms of anticipation in the management of their consumption: cards proposing to set a consumption limits, challenges or objective to reach for a determinate period of time retain attention. The dialogue with the participants seems to show that this interest relate to the state of general overload and cognitive saturation in which families feel to

be reinforced by this new option of managing energy consumption. In particular they seem to appreciate the interaction options that doesn't request constant attention but setting a target and adjusting according the results obtained and the possible efforts. Rather than rational behaviour, they acknowledge forms of *bricolage* between the possible and the desirable.

Finally, participants tends to privilege usual communication canals. The screen of the computer or the interface of the energy metering device is suitable for the initial setting of the system and for the period of diagnosis and analysis of the first collection of data. Afterward, for daily use, situated cognition (i.e; the display of the energy metering data directly on the device the data relate to) and use of everyday ICT devices (i.e. rapid check zapping on the TV screen; SMS reminder for over-consumption warning) seem to be more accessible and integrated in the household daily practices.

#### 4. SUFFICIENCY INTO DESIGN GUIDELINES TO ENGENDER NEW PRACTICES

For each of the 4 categories of domestic appliances focused by the ISEU project an original interpretation of the current situation emerged from the early investigations with the families, showing why according to them the current appliances proposed on the market were not facilitating energy-saving practices or, worst, were favouring energy overconsumption. For each category of equipment, a new design attitude has been identified between the users and the design teams that brought, on the one hand, to a series of emblematic concepts of new products and, on the other hand, to four design guidelines to favour energy-saving behaviours with a general value going beyond the product category they emerged from. For each product category, the sufficiency principle has been translated into more concrete principles.

- **"Subtractive principle and lighting environment"** allows imagination of new light switches and light distribution in the living environment to minimise the number of lights on;

- **"Semi-manual interface principle and thermal regulation"** reduces user cognitive overload in the fine thermal regulation with systems set to peoples' habits at home while facilitating users manual regulation;

- ***"Resetting default principle and clothing care"*** allows to prompt low energy-intensive washing processes and to push evolution of users habits;

- ***"Eco-conscious artefacts and energy smart meters"*** facilitates interaction of users with energy metering enabling them to streamline household practices.

We will develop here more in depth the fourth principle and the resulting products going ahead with the case on computer and energy smart meters.

The issue of energy in the use of computers is not important to users. The device consumes relatively little in regard to the extent and perceived value of its benefits. It represents an 'intelligent' object par excellence and the user expects it manages autonomously its energy consumption. We consider thus the computer under the particular perspective of an appliance skilled with a sophisticated control system and capable not only to optimize its own use of energy but also to manage the other appliances connected to it, which are part of the same household sub-system.

***An eco-conscious principle would allow designing systems that can autonomously optimize their use of energy, initially configured on the basis of an aggregation of consumption data in the form of indicators relevant to the user and easily adjustable daily by it.***

### **USBpower to manage stand-by modes**

The peripheral devices of the computer are more or less dependent and controlled by it as they are integrated or connected. Printers, scanners, speakers, external hard drives have their own power supply and requires management by the user of their power and their starting to limit their energy consumption. Instead of manually operating on their respective switches, these could be controlled directly by the computer (via USB or bluetooth), that would also measure their energy consumption. The set forms thus a 'cluster' of equipment complying with the eco-conscious principle. When installing the peripheral devices, a dedicated software

allows to configure their consumption profiles and the printer, for example, will only be switched on at the request of a print or for the duration of computer use. Once configured, the energy-using devices behaviours will be managed in a manner transparent to the user able to analyse the consumption of each device and if necessary, to return to the configuration settings of the profiles consumption.



**Figure 4.** Olivier H. and his wife are presenting the USBpower plug that allow the computer to control and turn on and off the range of peripheral devices connected powered with the plug.

### SmartMeter Tags as situated change makers

The eco-conscious principle suggests in a system of interrelated objects, some (with higher control capabilities) maybe manage and optimize the energy consumption of the other elements of the system (with lower control capabilities). And if this may be true for the computer and its different peripheral as a sub-system of the domestic equipment, the eco-conscious principle maybe extended to the energy control of the whole domestic equipment and appliances. The home computer can be an interface for energy management of any household subject to the analysis of a smart meter. This principle assumes that energy metering enables households to change their behaviours. Despite the efforts of communication about energy consumption, the energy flux supplied to the home is not inherently motivating for users. It is part of the infrastructure of the habitat and, except to have to optimize a growing bill it is not of interest in itself. More precisely, the structure of gross consumption by appliances is fragmented

and does not seem significant to a household that would analyze and change its practices: the heating and lighting are presented separately while they contribute to domestic comfort. To mean something to the users, it is necessary to develop indicators related to practices: according to housekeeping functions (maintenance of laundry, meal preparation, etc.) and to space (living room, bedrooms, bathroom, etc.), and reported to daily, weekly and monthly distribution average. Then users may think, compare and decide to act on the basis of an analysis of the perceived value of their consumption.

Beyond the static presentation, the interface can provide a dynamic mode to monitor and optimize its consumption. Again, management of energy consumption is more a management concern than a matter of spontaneous interest, and must be considered on the basis of an eco-conscious principle limiting the cognitive overload of users and facilitating their daily management. To do this, the interface should provide a dynamic management by objectives: households establish a threshold of consumption for some critical uses, which they want to monitor or control, and work then in adjusting their practices according to the margin of energy left.



**Figure 5. Stéphane X. and his daughter are presenting the SmartMeter Tags that display energy consumption of single devices, spaces or functions of the households and that can be placed directly on the device, in the space or in a place emblematic of a particular function of the household. The family can choose determinate consumptions to reduce and use the SmartMeters Tags to stimulate the effort of all family members during their usage time.**

## 5. CONCLUSION: USERS AS EXPERIMENTERS

The conclusions of the specific co-design sessions within the ISEU research project gave rise to 2 levels of benefits:

- the user-centred approach starting from household activities generated very interesting results without any technological improvement of the eco-efficiency of the domestic appliances: only resetting usage patterns by a redesign of existing components 'from the shelf' shows promising propositions in streamlining energy consumption practices of households;
- the very process of the co-design sessions, the progressive training of the families, their involvement in the design of their own future environment brought the research team to consider all the interaction process and the material developed to be used during the sessions between users and designers as a sort of training toolkit to question people domestic practices, to take a distance from them and enable the families to re-invent progressively their daily ways of living.

Beyond concrete propositions for new energy-saving practices, our research has also shown interesting lessons we can learn from the interaction with households.

Our ethnographic approach has revealed that households are much more creative in the way they save energy than the usual representations conveyed by the "rational use of energy" flyers for instance. All the process, particularly the collaborative sessions, shows how much our interaction with computers is often fuzzy and conservative. When users are given the possibility to imagine other ways of interacting with the objects they use, following a sufficiency principle, they reveal that our houses have embodied standard appliances and systems that do not fit desirable practices anymore.

To observe the willingness of families to play and imagine new devices, we had however to move away from the idea of ready-made products. After the first interview it appeared indeed that the propositions presented as products or services led respondents to a hedonistic situation, like "Would I buy or not?" rather than a change of attitude motivated by a desire to save energy such as: "Is this a good research direction that I can apply?". If there is a reason functioning in this approach, it is not the one of the rational individual seeking to maximize its welfare within a given budget. The co-design sessions showed that participating families are much more in a

playful and explorative situation than a pure economic calculation. Families who were ready to play the game, reveal the current system's constraints when asked to turn to energy-saving practices. Experimental situations are transitory, they always end up in final results, in "products". But the process itself is as well interesting as the result. We think that transition towards a sustainable society will require much more transitory experimental situations.



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# Towards Co-Designing Production Systems with Cyber-Physical Artifacts

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## ABSTRACT

*The paper builds upon the conceptual relation of co-creation to the established notion of participatory design. Therefore, we provide a short review of current literature on the participatory design process focusing on the used material in and the facilitation of such processes. Absorbing the dilemma of physical and digital objects yields the idea of cyber-physical objects for participatory design. A characterization of four examples concerning participatory design in the domain of production systems suggests that cyber-physical artifacts are already starting to move into these processes. We conclude with a discussion of future directions for cyber-physical objects in participatory settings and its implications for co-creation.*

## KEYWORDS

*Cyber-Physical Objects, Participatory Design, Factory Planning*

## INTRODUCTION

The involvement of customers to create new products or services under the umbrella of co-creation (Prahalad & Ramaswamy 2004) can be seen as a rather new and emerging concept (Ind & Coates 2013). However, co-creation has important antecedents in participatory design (see e.g. Kensing & Blomberg 1998), which relies on the involvement of multiple stakeholders during the design process. The basic idea is the integration of interested parties or stakeholders to yield an improved quality of the design result due to the inclusion of more diversified knowledge (Yanow 2004) and eventually higher acceptance of the solution (Coch & French 1948). It seems therefore feasible to build upon the insights of participatory design to enhance the methods and principles of co-creation.

Tangible objects play an important role in participatory design processes (Gauntlett 2007). This observation can be linked to the theory of constructionism (Papert & Harel 1991; Jentsch et al. 2012) since constructionism supports the notion of actively building with the hands in order to explore meaning. More specifically, a recent contribution by Hansen & Dalsgaard (2012) shifted the focus to the productive qualities - or technically spoken the functions - of objects in participatory settings. They stated e.g. that the material is important to provoke reflection among participants. However, the material is only one building block of a participatory design session. Pommeranz et al. (2012) pointed out that facilitation of the process is decisive for its effectiveness and creativity as well. A common challenge for facilitation is e.g. the involvement of all participants even though some might think they are not creative enough or lack sufficient knowledge to contribute to the design process (Sanders & Westerlund 2011).

Building upon these considerations, our consequent goal is to review the role of facilitation and tangible artifacts in participatory design processes especially in the domain of production system design. The review will prepare the ground for the concept of cyber-physical objects, which are expected to bridge the world of physical “hands-on” experience with the possibilities of platform-based co-creation in the digital world (Chesbrough 2011).

## CONCEPTUAL BACKGROUND

A general process model for participatory design could be split into the stages for (1) the conception and ideation, (2) the examination of use cases, (3) the manifestation of design ideas, and finally (4) the creation of prototypes (Hansen & Dalsgard 2012). Physical artifacts serve five major functions during these process steps according to Hansen and Dalsgard (2012):

- enable quick modifications (rapidly adjust the objects according to iterative design processes)
- align collaborative efforts (manifestations prompt the need for agreement among participants)
- document decisions (material represents a shared understanding at particular process steps)
- provoke reflection (objects allow for distance and relation to other connected objects)

- propose and support design changes (the material supports the generation of new ideas)

The list of functions apparently limits the range of possible materials to artifacts that are multifunctional and do not require artistic skills in order to support a heterogeneous group of participants during the design process. It is therefore rather common that participants use paper, pencil, or toy-like objects to mediate their communication and convey their ideas. The need for object simplicity is further echoed by authors who found digital artifacts as counterproductive and distracting (Pommeranz et al. 2011): Digital objects (still) require greater efforts for manipulation, which yields a higher threshold for participants to engage with the material. Hence, participants devote fewer efforts to their ideas and more to the mediating object itself (Sachse 2002). On the contrary, digital objects could be accessed worldwide and linked to process related analytics.

The outlined functions of objects may distract from the fact that most properties of the material must be catalyzed through appropriate facilitation of the design process: Participants are required to work in a structured and efficient manner, since design processes are usually time-constrained and goal-directed. However, the current state of literature reveals a striking dearth concerning the interrelation of material and facilitation. Pommeranz et al. (2012) give some general recommendations for facilitation:

- pay attention to participant's fatigue
- ensure that everybody can voice themselves
- make divergent and convergent opinions explicit
- break the overall task into smaller and manageable pieces

Notwithstanding their practical relevance, these recommendations address a particular person who is responsible to ease and guide the process for participants. This process configuration requires the presence of the facilitator and the constant evaluation of the process against the time constraints as well as the design goals. There are consequently no or very limited possibilities to run such design processes at distributed places and the process evaluation is limited by the facilitator's experience and real-time information processing capabilities. Coping with these limitations induces e.g. the necessity to limit the group size (e.g. Slater 1958 or Günther 2005) and causes ambiguity in the process.

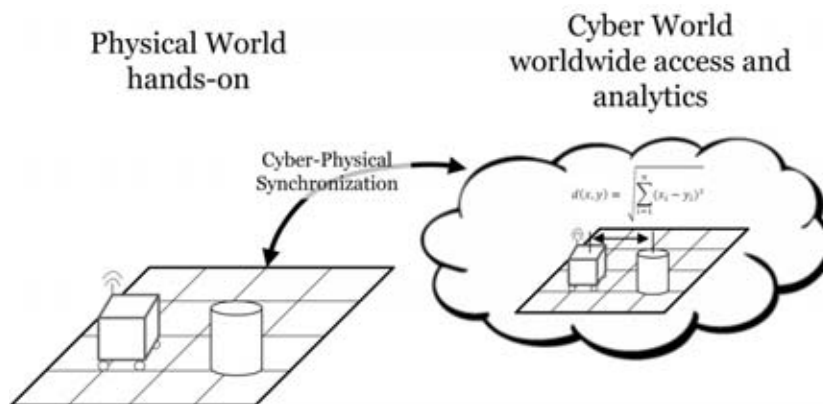
The previous discussion shall be summarized as a dilemma: On the one hand there are limitations of physical objects and their related facilitation

requirements. On the other hand there are the inhibitive properties of digital objects restraining participants during the design process while offering the possibilities to overcome the limitations of physical objects and the related facilitation.

A possible solution of the dilemma could be found in recent discussions concerning the internet of things or cyber-physical objects. Miragliotta et al. (2012) highlighted the following properties for such smart objects:

- self-awareness (e.g. localization and unique identification)
- interaction (measuring and actuation)
- data processing (e.g. filtering of information)
- communication (e.g. with other objects)

For instance, one could imagine a physical and self-aware design artifact that can be addressed via the internet and that is capable to tell its position in a workshop room (self-awareness). This object could have a second digital entity of itself in a different (digital) environment and therefore would be accessible to others, who are not close to the physical entity of the object. If the physical object had interaction capabilities like a motor and wheels it would be possible to change even the location of the digital entity and have the physical object moving accordingly. The following figure summarizes this line of thought and provides an example of enhanced facilitation by analytics – here a simple Euclidian distance measure for two objects.



**Picture 1** Idea of cyber-physical design objects

In order to ground the preceding thoughts on cyber-physical design artifacts, we review in the next section four instances of physical materials and their applications in participatory production system design processes.

## APPLICATIONS

Subsequent examples are drawn from (Tröger et al. 2012) and (Jentsch et al. 2012). They represent the great variety of employed material when facilitating industry and student groups during production systems design.

### **Cardboard-Engineering**

Cardboard-Engineering utilizes simple mock-ups of real objects based on handicraft material like paper, cardboard, Styrofoam, etc. It has become a common method bridging digital planning to the physical realization of products, production facilities or work places (Gorecki & Pautsch 2012, Schuh et al. 2010).

The method gained popularity in the field of lean production and highlights the importance to integrate various stakeholders (e.g. shop floor employees) in the design process to foster their feedback on planning solutions. Hence, workers obtain the possibility to work e.g. in their future assembly station in order to find improvements before the work place is actually built. Specific requirements for process facilitation are not documented in the sparse literature on cardboard-engineering and there is no direct link between the digital planning solution (e.g. a digital facility layout) and the mock-up.

### **IntuPlan**

IntuPlan is a specialized method supporting the planning of factory layouts (Okur et al. 2009). This method utilizes scaled 3D prints of production equipment like machinery and aims at integrating non-experts into the design process. The goal of such a design process is to locate objects in the two dimensional space of a factory floor while minimizing e.g. transportation efforts between each station.

Printed models of the IntuPlan-method carry an optical identifier allowing for a linkage between the physical objects and their digital representations in a professional layout planning system. The digital planning system is capable to run simulations, e.g. in order to evaluate material flows. Synchronization between the physical and digital world is attained with (digital) photographs, hence, interaction does not happen in real-time and the design process is concentrated at the place where the physical models are. There is no distributed work, as outlined in the previous chapter, possible and evaluation results are delayed.

## Metaphors with LEGO-bricks

Building metaphors with the famous plastic bricks, mini figures and their gadgets became known as LEGO® Serious Play® (LSP, see e.g. Kristiansen et al. 2010). The related LSP-method requires workshop participants to build their own metaphors, combine several metaphors into a short story and present this story to each other. Further steps in the process can be used to combine individual models into an agreed group model, which could be then situated in a landscape with other influencing factors. Those factors may be linked physically to the group model yielding e.g. the competitive landscape and its impact on a production system. Participants materialize therefore rather abstract representations concerning the particular workshop topic (e.g. operations strategy).



**Picture 2 Building stage during a LSP-workshop and complex model landscape**

The physical approach to abstract topics enables participants to structure their thoughts, receive inspiration from the material and explore all three spatial dimensions to create meaning (opposed e.g. to drawings). The whole process does not require the skills of an artist to express thoughts. Sharing stories with others is eased due to the visual properties of the material. However, a particularity of building metaphors with bricks is that the meaning is not self-explanatory. This is one reason why the LSP-method emphasizes the sharing by means of story-telling after each round of building. Hence, the productive function of the bricks for documentation (see previous chapter) is rather limited for outsiders, who are not participating in the design process.

Facilitation of the design process is to large extent dependent on the facilitators: They receive a standardized training covering e.g. the thinking of how to break a complex topic into manageable pieces. However, the dynamics that occur during such rather open and communication intensive workshops induce the need for high situational awareness, experience and background knowledge for the treated workshop topic in order to attain the design goals.

## Mindstorms Production Systems

The fourth and final example for participatory design is also related to the products of the Danish enterprise and employs their robotic sets called Mindstorms. Here, mostly student participants use LEGO bricks, sensors, motors, and programmable controllers to build a simple production system according to a “customer” specification. Educational settings employ a fictitious customer accordingly. Necessary functions of a production system comprise e.g. sorting, transportation, and assembly of bricks to automatically build simplified products like cars or circuit boards.



**Picture 3 Students building and programming production systems**

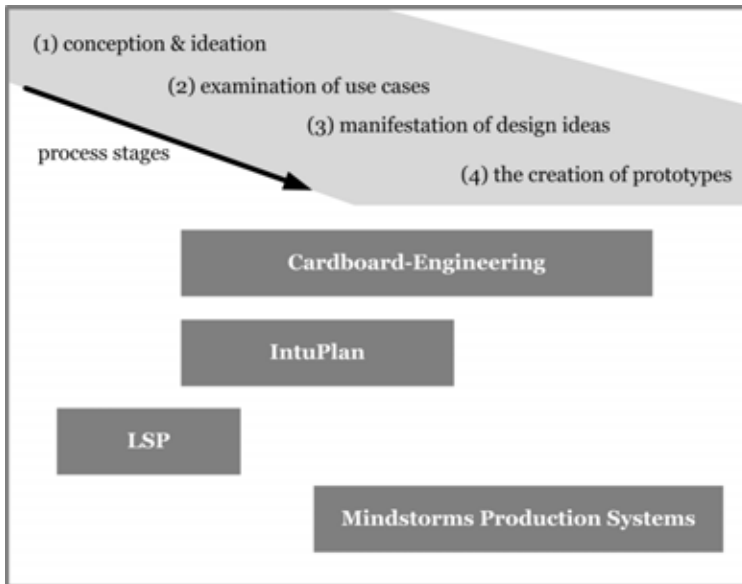
The general idea of having groups of students building such models is to link conceptual work and planning activities with the experience of actually realizing the physical model of a planned production system. Hence, participants encounter e.g. the difficulties associated with real-time project management, the adherence to previously defined characteristics of the system during the physical realization stage, or interface problems during the integration of subsystems into the whole production system.

Facilitation of the design process is framed by learning objectives (e.g. how to define interface requirements), role play elements introducing e.g. the fictitious customer and the facilitator’s situational awareness of the group development (e.g. detecting when groups are getting lost in details).

## CONCLUSION AND OUTLOOK

The preceding discussion concerned four rather different applications of physical objects in participatory design of production systems. The following figure provides a summary based on the outlined process stages from Hansen and Dalsgard (2012). The figure underlines e.g. the broad spectrum of cardboard-engineering and the narrowly focused application of LSP.





**Picture 4 Comparison of the four applications**

It might appear as an anachronism to devote much room to a discussion of physical objects in the year 2013. However, the presented research findings and own experience from numerous design workshops stresses the importance of physical objects. The digitalization has not yet flourished to support participatory design with a comparable low threshold. One reason could be that the presented cases are consistent with the recognition of physical artifacts as an important element of participatory design based on constructionist theory and the five functions proposed by Hansen and Dalsgaard (2012). All instances of material share the productive qualities whilst these qualities are not (yet) measureable.

However, the conceptual extension to aspects of facilitation yields a current drawback of most design processes: It depends heavily on the facilitator, who needs to be present during the design process and carries the burden to drive the process in real time, which limits e.g. the possibility to provide quantitative evaluations of design solutions to the participants. On the one hand, the case of IntuPlan shows a promising direction linking the physical and digital world offering further facilitation opportunities based on cyber-physical artifacts. On the other hand, the application of LSP demonstrates a high share of interpretation and story-telling when using physical objects. The implicit nature of materialized metaphors would certainly benefit from having a digital counterpart. Nonetheless, the enormous variety and amount of LEGO-bricks used in such design session forecloses at the moment a real-time synchronization with a digital model.

The implications of the paper are twofold. There is a theoretical or at least conceptual gap explaining the role of facilitation during participatory design processes and its interplay with the material. The preceding discussion remains like other contributions anecdotic. Building upon the required theoretical contribution, future work could help finding applications, where cyber-physical objects harness great potential.

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## **Constructing a collaborative agency for learning with a customer during the implementation of process-optimization software**

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### **ABSTRACT**

*The aim of this paper is to analyze how collaborative agency for learning with a customer is constructed during the implementation of process optimization software into a chemical pulp mill. This kind of collaborative agency for joint learning could be seen as an important element for the profitability of business related to new kind of customer-intelligence software products. The construction of collective agency is analyzed as a process of continuously evolving dynamics between the learning subject, the object and the tools for learning from the viewpoint of cultural-historical activity theory. Ethnographical data utilized in this paper is collected in the developmental and research project commissioned by an automation firm which is a global supplier of process automation solutions and services for pulp and paper making industry.*

### **KEYWORDS**

Collaborative agency, customer-intelligence product, cultural-historical activity theory, expansive learning

### **INTRODUCTION**

“At the last time when we held a meeting with this senior engineer of the pulp mill, he said that “by the way. We both are the members of the same team even we are paid by different firms.” I was so surprised that this senior ever came to say me like this. It was like a big bonus to me.” (The automation engineer 18 August 2003).

In this excerpt an engineer of an automation firm tells about the meeting he had had with the representative of his customer, the senior engineer of pulp mill. In the meeting they had investigated the parameters of customer's pulp production process for developing it with the help of an optimization software produced by the automation firm.

An optimization software processes data, which measuring instruments provide about the actual pulp production process. It regulates the settings of the basic automation to optimize the use of materials and energy to secure the stability of the process, minimize costs and ensure high quality of the output. An optimization software is designed as specific for every single department of pulp production (e.g. cooking and bleaching). It could be seen as a good example of so-called customer-intelligence product (Victor & Boynton 1998, 195). This kind of product is never ready because it is always tailored to the particular production process and as changes occur in this process, also software requires re-configuration. Therefore, rather than as a single product, an optimization software is better conceived as a package of different service and product components. Due to this character also continuous collaboration between the automation supplier and the representatives of customer is needed.

Comparing to deliveries of basic automation, the logic of value-creation is different when providing hi-tech optimization software. A payment paid by customer is not based on the one-time delivery of automation product rather than on the results gained on the client's pulp production process with the help of optimization software. In terms of learning this could be interpreted thus that the profitability of automation supplier, as well as customers' ability to produce high-quality pulp, are more depended on the results of collaborative learning between these partners.

The role of optimization software in this collaborative learning is crucial thus it serves as a collaborative tool for master the joint object of learning, customer's pulp production process. The customer's sense being 'the same team' could be interpreted then that separate agencies (a producer and a customer) have evolved into a collaborative agent (the same team) which could be seen both as an important base for collaborative learning and as a significant result of collaboration.

In this paper I examine the formation of collaborative agency and the related practices of collaborative learning during the implementation of new optimization software package to the client's pulp mill. I operationalize an agency from the context of activity system: constructing a collaborative agency requires reorganization of the structural dynamics of activity in which this collaboration occurs. I have collected the ethnographical data,

which I use to analyze this transformation in a developmental project commissioned by a global automation supplier of process automation solutions and services for pulp and paper making industry.

## THEORETICAL BACKGROUND

### **Activity as tool-mediated and object-oriented**

My inquiry is grounded onto the cultural-historical activity theory (CHAT) (Engeström 2005; Leontjev 1978; Vygotsky 1978). In CHAT human activity is viewed as mediated by different culturally evolved material or psychological tools and signs in order to master the object which gives the shape and the direction to the activity. It is then the object which gives the true motive for activity as well as for a learning activity also. Therefore the subject of learning could be understood as one who has the motive, i.e. object, for learning.

The distinction between an individual goal-directed action and a collective object-oriented activity is of central importance (Engeström 2000, 156). According to CHAT, collective activity is driven by the object which is at least partially shared by the subjects of a historically developed activity system. This object of activity system is both something given and something projected, anticipated and constructed. The hall mark of collaboration is that two activities are bound together on carrying out a partially shared object. This requires new forms of distributed and coordinated agency (Engeström 2005 ,98).

The subjects master and cultivate the objects of their activities by using mediating artifacts (i.e. tools). Optimization software for the pulp production is thus a good example of a tool which combines together activities across organizational boundaries from the separate objects (a production of optimization software, a production of pulp) to a partially shared object (developing a pulp production process with the help of optimization software) (see Kallio 2010).

### **Learning as adopting, applying and producing generalizations**

According to CHAT the object of work-related learning could be approached as parallel to the object of work production. Therefore learning could be conceptualized as the cultural process of adopting, applying and producing production-relevant generalizations (Pihlaja 2005, 70-78). The structure of dominant type of work activity affects its way of generalizing. Situation-bound perceptual-functional generalizing is typical in craft production which is characterized by practical manipulations of objects and

acquired through participating in the work practice (Virkkunen & Ahonen 2011, 232). In craft production the outcomes of generalization (i.e. learning) are mainly preserved as social practices and forms of implements used in the work (Pihlaja 2005, 89). Knowledge produced this way is relevant for questions *what* and *how*, but the systemic relations and their contradictions behind activity are seldom questioned by asking *why*.

Abstract-empirical generalizations have become more common due to technologically advanced societies in which more abstract thinking is required (Luria, 1976). The idea of abstract-empirical learning live vitally in a distribution of labor in industrial organizations: specialists produce empirical generalizations about and for production which are then educated to the shop-floor workers by using the methods typical to the traditional school teaching. These empirical generalizations can get their existence for instance on expressions of best work practices or descriptions of causal chains of production processes.

### **Mediating tools of learning activity**

The different forms of generalizations are preserved as different forms of artifacts which have different qualities in reflective thinking and creative action (Virkkunen ja Ahonen 2011, 233). These could be understood as mediating tools of learning activity.

Wartofsky (1979) has formulated a three-level artifact categorization, which comprises externally objectified artifacts as well as internal psychological tools. This classification has been further elaborated by Engeström (1990). In his formulation, Wartofsky's primary artifacts are termed *what*-tools, and they are basically the external entities used in an activity, such as a technical form of optimization software as well as the marks of actual pulp production process on a computer screen in a control room.

Wartofsky named a second category of artifacts as secondary artifacts of which Engeström differentiates between two types of tools, i.e., *how*-tools and *why*-tools. How-tools are artifacts such as routines and procedures that tell us how to handle a certain object of an activity with a corresponding to primary artifact. How-tools can be both external and internal. For instance, manuals for the use of optimization software may be found in a written form, while operators in pulp mills have their personal internal versions of them also. These external and internal manuals, how-tools, then tell how to drive a pulp production process with the help of optimization software.

*Why*-tools inform why the object of an activity behaves the way it does (e.g., variables of pulp production process), which justifies the selection of some

specific primary artifacts (e.g. use of optimization software or driving a process manually). These why-tools are internal, mental explanatory models (theory of pulp production) but they can also be externalized in words, drawings etc. (Engeström 1990.)

Engeström (1990) also identifies tertiary artifacts, which he terms *where-to-tools*. These are tools that “go beyond the explanatory or diagnostic ‘why’ function” (Engeström 1990, 194), and as such they are close to Wartofsky’s imaginary (tertiary) artifacts. Where-to-tools can be described as projections into the future, or a vision of what will follow from, for instance, what kind of new tools are required for mastering the re-formed object of work activity. The primary psychological importance of where-to-tools may be their power of motivation; an analysis and vision of the future is important for motivating acceptance and implementation of new tools (Susi 2006, 31). For Engeström (1987, 154) where-to-tools are used for the transformation of collective activity system through expansive learning thus they are not tools for individuals.

Rheinberger (1997) has presented an idea, that every object has always a practical (technical) side which is reached by primary tools (e.g. an actual pulp production process) and the epistemic side reached only by representations of it (e.g. theoretical models of pulp production). He describes a scientific work as a continuous interplay of a learning motivated by a practical object and a learning motivated by an epistemic object. Similarly, optimization software, as well as a pulp production process, could be described as a dualistic entity consisted both by a practical side and a theoretical side, latter being a target for constant attempts to define it by creating representations of it.

### **Expansive learning and contradictions**

The relation between the subject, the object and the tools of learning is reciprocally systemic and continuously evolving (Ahonen 2008). While learning, a subject encounters problems and attempts to solve them with the help of existing tools and resources. However, this may generate new questions which put the current learning object questionable. In order to resolve dilemmatic situation, learner has to reconstruct not only the object of his learning instead of the tools, rules and the subject of learning also.

Engeström (1987) has named this kind of learning as expansive. It prompts out from pre-defined intentions of learning and leads to an expansion of cultural-historically developed activity system from one relatively stable form to another, qualitatively a more advanced form. This expansion



emerges through qualitatively different phases. In each developmental phase, a different kind of inner contradiction forces the transformation to proceed. For Engeström contradictions are thus not solely obstacles or ruptures encountered in daily practice; rather those difficulties are understood as indicators of deeper structural and historical contradictions in an activity system.

Internal contradictions find their outward expression in external ones on four levels (Engeström 1987). The first-order contradiction is so called *primary contradiction* which is always present in the market economy. This means that the elements of an activity have a dual character, being at the same time, on the one hand, elements in the activity system (e.g. use-value of optimization software) and, on the other, objects of commercial exchange in their respective markets (exchange-value of optimization software). This contradiction between use-value and exchange-value creates first a dilemmatic need state in which the existing system of the activity is increasingly questioned without any clear idea of way forward.

Further changes create *secondary contradictions* between some elements of the system. For instance, the tools for delivering basic automation product are incompatible while implementing optimization software. These secondary contradictions cause disturbances and double-bind situations in practitioners' daily work as different elements of the system draw them in opposite directions.

The increasing amount of disturbances leads the actors to analyze the causes of problems and to search for a way to overcome the secondary contradictions. While attempting to find a way out of the contradictory situation, a novel exemplary way of acting or an idea of a new logic, a "germ cell" of a new structure of interactive relationships, emerges and is taken as a model for a new form of the activity. The generalization of the new model in the activity leads to *tertiary contradictions* between the old and the new concepts and practices. Therefore, in the last phase of the expansive transformation, the focus of change moves to solving *quarterly contradictions* between the new form of the activity and the old practices in other related activities on which it is dependent.

The implementation process of optimization software to a chemical pulp mill could be seen as a fascinating example of expansive learning. In this process not only agency but the whole structure of activity is reorganized from discrete agencies operating with separate tools to separate objects to a collaborative agency directing their activity by joint tools to partially shared object.

## METHODOLOGY AND DATA

The data analyzed in this paper is collected during the developmental and research project commissioned by the firm supplying process automation solutions and services for pulp and paper making industry. The practical aim of the intervention was to regenerate learning related to recently launched optimization software business and especially customer co-operation connected with it. In this project the methodology of developmental work research based on CHAT was utilized (see Engeström 2005).

The data collecting method applied in this study could be called developmental ethnography (see Kerosuo 2006, 92). Long-term fieldwork typical to traditional ethnography is replaced by brief ethnographic visits to customers' pulp mills for solving particular research problems posed by an ongoing developmental project. Instead of describing the *status quo* of an activity, critical aspects of an activity in terms of development, learning, and change are explored.

I have analyzed data collected not only during one case instead of several implementation projects of optimization packages to chemical pulp mills in years 2003 - 2004. I have followed automation engineers to their clients' plants and observed their interaction with the pulp production practitioners. Several actors on different levels of organizational hierarchy both in suppliers' side as well as customers have been interviewed. In addition, other data gained during the developmental project; developmental sessions, interviews and discussions as well as numerous documented data are treated as equally important.

Theoretical pre-insight based on CHAT has focused data collection as well as data analysis. Similarly than Rheinberger (1997) describes scientific work in general, I have learnt from my object of study as interplay between a practical context of pulp and automation production and the theoretical context of CHAT.

## FINDINGS

The object of productive activity for the automation supplier is to produce optimization software which has use-value for customer. Consistently, customers' activities are motivated by producing high-quality pulp. The exchange-value for producer consists of the sale of optimization software and additional services. However, differently than with a basic automation

business, value is created not only in the transaction of optimization package. Instead, the supplier is paid by the results gained in the customer's production process with the help of optimization software. These results are measured and verified according to the jointly agreed statistics.

In the beginning of implementation project both partners need *what*-kind of understanding about their collaborators' activities. Therefore the first step is the mill study in which customer's mill is audited by the automation firm before the final composition of the software. In addition to the production process, the courses of action of the mill and even the mental models of individual operators for driving the production process are analyzed:

"What we do... not only putting the control software in its place there, but we go through all the measuring equipment at the mill. All driving models...even the mill organization. How it works." (The automation engineer 3 October 2003)

This kind of information is mostly tacit and implicit and therefore difficult to share. The operators of pulp mills are key informants even many of them lack ability to describe explicitly this knowledge embedded in their daily activities.

The automation engineer mathematically models the relationships between parameters in the customer's chemical pulp production process and creates on the basis of that the model for software that optimizes the process. The development of process-optimization software is not "a desk development work" but takes place for the most part at the customer's mill:

"Often it is so, that we get the enhancement idea here. We make the basis modules here but we must go to the mill. We must have the time and opportunity to install and introduce and follow how they work." (The automation engineer 3 October 2003)

The product-development of optimization software could then be interpreted as an epistemic movement between a practical object (an actual pulp production process) and a theoretical object (the theory related to optimization of pulp production process). The results of this learning get their existence in the form of technical artifact, optimization software.

The supplier provides an initial training for forthcoming users of optimization software. This takes place in a classroom in the training facilities of the customer's mill and includes explaining the functions of the software and the instructions for its use. In this basic training the tools for understanding *how* optimization software is used are provided for the customer.

The phase when the software is embedded to its usage environment is very critical; product-based learning is replaced by use-based learning. It could be conceived as a step forward from discrete objects of activities (optimization software + pulp production process) towards the partially shared object (optimization of the pulp production process with the help of the optimization software).

Optimization software is a new kind of tool for operating the pulp production process because unlike basic automation, which is a tool for operating the production manually optimization software somehow “drives itself”:

“The old equipment was about twenty years old, and now they brought like totally different equipment into its usage environment. [ . . . ] The operating philosophy and world of ideas are a bit different, which is a challenge to the user to be able to get into it.” (The engineer of pulp mill 3 February 2004)

Measuring instruments provide data about the actual pulp production process and software regulates the settings of the basic automation to optimize the process. Operators analyze provided data in order to trail possible disturbances in a pulp process. As the object of work/learning activity transforms from operating the actual process to analyzing data about it, operators are challenged to deepen their knowledge about the chemical pulp production process in general. In the terms of learning this could be translated thus that when operating with a basic automation, operators make generalizations about the different parameters of pulp process. With an optimization software they have to create generalizations concerning the different relations between these parameters.

In this situation operators could encounter a double-bind situation when mental models for driving pulp production manually are incompatible for diagnosing data about the process produced by optimization software. This could be interpreted as an implication about a second level contradiction in the activity system of the operators between the old tools and the new object of activity.

In this phase both partners tend to prefer physical presence of automation engineer in the customer's mill because the mental models for driving the process with optimization software are better shared by side by side in the mill environment than e.g. via distance connection. The operators of pulp process also need someone to strengthen their trust to a new tool. Without this support operators used to resort to manual driving in problem situations. This kind of substitution of a new tool for an old one could be interpreted as an expression of a third-level contradiction between new and old elements of activity.

Having already some experience with the software, the operators wanted to understand its functioning more deeply. The initial training, according to the operators, is mainly about the “buttons and keys” that one had to push to make the software work. After using it for a while users need to learn more about the optimization model behind the software in order to know more about *why* software is behaving in the way it does when controlling the process. As well from the supplier’s side the transferring of the optimization models is experienced important:

“[Operators] do have some know-how of the process, so that they know where the pipes are and very precisely what goes to where. But it is more like this transferring of a model of thinking. They should learn to think about things more broadly.” (The automation engineer 4 June 2004)

Evidently it is questionable on which level customer could be introduced to the optimization models behind the software product. The core competence of the automation firm engineers is based on understanding of the dynamics of pulp production and therefore this is also the core of competitiveness of the automation firm. However, knowing the model behind the software could be seen as a crucial step for the operators from just driving the process with the help of preserved abstract-empirical generalizations to developing the production through analyzing and resolving dilemmatic situations in a process.

In the beginning of implementation process the object of learning is the optimization software per se. First, for the engineers of automation firm who develop it and then for the users who have to learn how to use it. After software has successfully implemented into its usage environment, the systemic relations of the object, the tools and the learning subject are reorganized. The software is transformed as a collective tool for master the joint object of collaborative activity: developing the customer’s pulp production process.

Both partners expressed need for some kind of meta-tools, for instance the tools for “acting with the customer”:

“It would be useful to get some tools for how to discuss with the customer or act with them in general. I have done this kind of work for couple of years and got some kind of picture of it. Therefore I manage somehow but it would be great to get more training for acting with the customer.” (The Automation engineer 23 June 2003)

This reveals something about the need for developing the collaborative activity based on the optimization software product. In the developmental project arranged in the automation firm ideas and models, *where-to-tools*, for developing this kind of activity were generated in a dialogue with the

representatives of customers. In this kind of developmental work the object of joint activity is not anymore only the customer's production process instead of the wholeness of the joint collaborative activity.

## CONCLUSIONS

In this paper the development of collaborative agency for learning during the implementation of process optimization software to a chemical pulp mill have been analyzed. Relying on the ontological assumptions of CHAT, it has been clarified, how construction of agency is understood, rather than as a static quality of being 'same team', as a continuously evolving dynamic structure of elements of activity systems. On the phases of this process different kind of culture-bound tools for learning are utilized and different historically developed inner contradictions of activities solved.

Collaborative agency for learning could be seen as a substantial element in a new kind of business based on customer-intelligence hi-tech products (i.e. co-creation or co-configurative work). For intended developing of this kind of activity, HRD tools based mainly on abstract-empirical generalizations may be solely inadequate in reaching the dynamical inner relations of activity. Therefore methods enhancing understanding of historically and culturally evolved systemic relations of activity are required. In this, developmental methods grounded on developmental work research (see Engeström 2005) may provide useful support.

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# Designing the Future Together – Expanding the Paradigm by Combining Futures Studies and Design Games

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## ABSTRACT

*In this paper we present a method for design studies by combining design games and futures studies and by following the Scandinavian research tradition of co-creation and participatory design (Bødker, 2006). We have extended the methods' scope and the area of application by empirically evaluating them on the grounds of requirements that have been identified in the futures studies. The collaborative design methods have many overlapping properties with futures research methods. We conclude that the combined method provides important advances that make it a tempting alternative to the designers, futurists, and researchers by establishing a reflective layer in discussion of design alternatives.*

## KEYWORDS

*Design games, storytelling, foresight, expert methods, scenarios*

## INTRODUCTION

In this paper we examine how combining design games and futures studies expand the design research paradigm. The study was carried out in our recent research project Kasi – Future Information Security Trends. The project aimed at finding out the most important information security trends of the near future. In addition, the purpose was to sketch out a method for the continuous analysis of the future information security trends. (Pitkänen et al, 2011)



The two main phases of our foreseeing exercise were to imagine how the ICT mediated everyday life might look like in Finland in the next 5 to 10 years and to identify relevant information security trends, risks and opportunities in the imaginable futures.

If we had applied traditional futures research methods the first problem could have been addressed with scenario methods. These methods have been designed for inspiring imagination and for helping to identify alternative futures that are not predetermined (Johansson & Linde, 2005; Kahn, 1967).

The second problem – identifying information security trends, risks and opportunities – resembles an evaluation exercise where different matters are categorized, valued and compared. In futures studies this kind of an expert evaluation has usually been implemented with so called Delphi methods. With these methods the results are attained through an argumentative communication process (Kuusi, 1999; Turoff, 1975).

Instead of using scenario and Delphi methods from futures studies we applied collaborative design games in our foreseeing exercise. This idea came from our earlier experiences with different design methods.

Here we concentrate on two game-like collaboration methods called the Storytelling Group and the Project Planning Game. The methods have been developed in the Extreme Design project, which studied exploratory user-centered and co-design methods in the service design domain. Originally the Storytelling Group was designed for grasping the complexity of services with narratives, whereas the Project Planning Game aims at bringing out potential contradictions between the interests of stakeholders early in the collaboration process in order to reach a commonly created and agreed vision for collective action (Johansson et al, 2011).

In the following, our purpose is to extend the scope of these design games. Our work is a contribution to human-computer interaction studies, design research and futures studies. We analyze design methods with the criteria that have been developed in futures studies, and give an example about how to apply design methods in futures studies.

## METHODOLOGICAL REQUIREMENTS

### **Requirements from Scenario Methods**

Scenario methods have been created for helping to imagine alternative futures and to analyze their probability, preconditions and consequences.

The main goal in scenario building is not necessarily to create a perfect description of the probable future but to understand which factors need to be taken into consideration if certain conditions materialize (Pitkänen, 2006).

The main problem with scenarios is that they often resemble the present state of affairs. Thus, the main criterion for scenario building is to think in a creative way without the restrictions of our present understandings or established ways of seeing things (Jarva, 2002).

The resulting scenarios can be presented in many forms. If we concentrate on literary scenarios, then it is relevant to ask, how these story-formed scenarios are best created. By experience we know that story-formed scenarios are tedious to work out. Thus we need a method that structures the work of experts directly into a story form. In addition, it is important to pay attention to the readability of scenarios because it affects the communicability and the outside impact of the particular foreseeing activity in general.

### **Requirements from Delphi Methods**

According to Woudenberg (Woudenberg, 1991), Delphi methods can be characterized with three key features: anonymity, iteration and feedback. Delphi method is also ideally based on thorough argumentation that aims at collective consensus. Although consensus can be interpreted as a validating feature of the Delphi results, there are also acknowledged problems with it: in the worst case it might prevent exceptional ideas from emerging (Kuusi, 1999).

Another problem with Delphi methods is the need for considerable amount of resources. The iterative process is time consuming because argumentative and thorough participation requires a lot time from the participators. It is also time taking for the organizer to conduct and analyze massive argumentation rounds that might ideally concern as many as 150 participators (Kuusi, 1999).

### **Other Requirements**

The main objective of future research methods that lean on expert participation is to find out changes that are not prevailing at the present but that might have potential to become such in the future. It is often assumed that these emerging phenomena are already giving weak signals on their existence (Hiltunen, 2006). They can be identified, for example, in preliminary thoughts, unordinary ideas and in marginal behavior. Also tacit knowledge of experts – knowledge that is not or cannot be given in explicit

forms – might represent weak signals (Kuusi, 1999; Polanyi, 1983). The methodological problem is how to find out these signals.

Both in scenario and Delphi studies the composition of the participating group of experts likely has a strong effect on the research results. However, this issue might be possible to solve in part by creating conditions where participators can take the role of others and identify themselves with individuals and with the ways of thinking that are not present in the process.

The outside impact of the foreseeing work is considered relevant because studying and knowing about the future are strongly interlinked to the making of the future. The principal methodological expectation is that knowledge created in the anticipation process should be applied in the actual creation of the future (van der Meulen, 1999).

## APPLYING DESIGN GAMES

In the earlier Extreme Design project, design games were applied in order to develop services with the collaboration of developers, users and other stakeholders. Design processes were formulated as game-like activities. The purpose was to enable rapid service development. The Storytelling Group was created for helping to write narrative scenarios of different possible service designs. The Project Planning Game was designed for solving problems with the contradictory interests of multiple partners in the beginning of the service development project (Johansson et al, 2011).

In the research project, we wanted to apply these design games when creating future scenarios (*The Storytelling Group*) and when identifying and valuing information security trends, risks and opportunities in the scenarios (*The Project Planning Game*). The participators in the project were Finnish information security specialists from both the public and the private sector, from 15 to 20 participators in each session. The project consisted of six separate steps: 1) outlining the general future environment, 2) creating concrete future scenarios, 3) analyzing information security issues in the scenarios, 4) identifying information security trends, 5) specifying factors and attributes that affect the realization of the trends, and 6) proposing a method for a continuous analysis of future information security trends (Pitkänen et al, 2011). In this paper we concentrate on the second, third and fourth phases.

## **Imagining Futures with the Storytelling Group**

The Storytelling Group has been created for combining different features of several design methods. Especially it combines collaborative scenario building and focus group discussions under the same process. The idea is to create concrete use-case stories as a result of the collective storytelling process. Originally the method was developed especially for design cases in which a long time perspective plays an important role (Kankainen et al, 2011).

The goal of our scenario session was to imagine how the ICT mediated everyday life might look like in the near future. In the beginning of the session the participants were divided into two separate groups. In order to provide data for the comparison, both groups created one scenario with the Storytelling Group method and one with a free brainstorming method that concentrates on actors and concrete events on a timeline.

The broad frameworks and themes of the stories were given by the researchers but the actual stories were freely written by the participants. In order to bring in relevant societal macro factors – like the aging population – four different macro scenarios were presented for the participants (one per each scenario story). For these macro scenarios, we chose four global scenarios created by Finnish policy think tank EVA (EVA, 2009). We found EVA's context scenarios very useful because they were thought-provoking and thus helped the scenario builders to overcome their normal ways to see the future.

In addition to macro scenarios, the work of the groups was guided by a short introductory text that directed participants to think about a story of a certain person in a certain life situation. The resulting scenarios concerned a recruitment of a foreign employee, a future home help service for the elderly, tracing of a person who had fallen ill on a journey, and a school bullying case. All the scenarios described some characteristics of the everyday life in Finland in the next five to ten years. The scenarios about the future home help service and about the person who had fallen ill were created with the Storytelling Group method.

The resulting scenarios described in detail, for example, how people are able to avail of their digital footprints in building their public images, but also how digital footprints can threaten people's privacy. They also illustrated, how combining data from different sources may help in emergency situations, but also make it difficult to control privacy.

## **Evaluating Futures with the Project Planning Game**

The Project Planning Game has been developed for helping to create a setting where different kinds of views and opinions can come out equally and deliberated collectively (Johansson et al, 2011). Because design teams often include members with varied skills, areas of interest and professional languages, collaboration may be sometimes problematic.

The Project Planning Game is used to overcome the possible challenges caused by the several goals and interests involved in design projects. The principal aim is to become aware of the potential contradictions early enough in order to reach a common vision or plan for the action.

The outcome of the Project Planning Game, originally the project plan, sets the stage for collaboration by defining main objectives and pointing out distinct interests that the stakeholders or individuals might have. According to the developers, one of the strengths of the game is resulting shared vocabulary among the participants who have different backgrounds and represent various professions (Johansson et al, 2011).

In our project, the second workshop was arranged for the analysis of the scenarios that were created in the first workshop. The participants were divided into two separate groups in order to get comparable results and bring out potential differences in the deliberation of different experts. The transcribed scenarios were presented to the participants and they were asked to identify relevant information security issues. Before the session, the research group had identified about fifty different information security issues from the scenarios. These issues were then combined with the issues brought out by the participants. For example, several information security issues related to increasing digital footprints and increasing possibilities to combine data from different sources were identified.

Next, the issues were grouped through an argumentative process. The participants categorized the issues by placing and organizing them on a game board, which was an A1 sized sheet of paper. After the participants had grouped the loosely defined information security issues, they were asked to analyze these issues in order to identify information security trends. The issues were categorized and evaluated with a given conceptual framework. The evaluation was also structured as an argumentative process.

## **ASSESSMENT**

We stated above that in these kinds of methods one must pay attention to the creativity of thinking, the form of the results, anonymity, iteration, feedback, the quality of argumentation, pros and cons in pursuing

consensus, and the amount of resources needed. Also, from general discussions on expert methods we can derive requirements like the amplification of weak signals, adequate composition of participators, mediation of conflicting interests, and the societal impact of the foreseeing activity.

### **Storytelling as a Scenario Method; Creativity and Concrete Thought**

The creativity of the foresight process is important because the participants need to break away from the limits of thought. In our case study we observed that the Storytelling group provides a playful and relaxed atmosphere for thinking freely (Johansson & Linde, 2005). Playful environment makes it easier for the participants to play with their ideas and present even unordinary viewpoints.

There was one special feature that we interpreted as an example of creativity and unordinary thinking in the storytelling groups. The participators paid special attention to particular human practices that could be described as a gray area. For example, in the scenario describing the future home help service, the participators invented different ways how the story characters could misuse future services and technology for their own benefit. This might be interpreted as a weak signal for new kind of social reliance.

Sometimes experts tend to think in too abstract terms. We found out that The Storytelling Group encourages participators to think concretely. Storytelling starts with the participators thinking and presenting their own personal experiences. However, to succeed, the method requires facilitators who are able to lead the storytelling activity to this direction by bringing out concrete questions and examples.

Literary writing exercises tend to favour participators who are better writers. The Storytelling Group diminishes this effect because it relies on collaborative storytelling. As a consequence, individual differences in communication skills do not determine the outcome of the process – unless certain individuals succeed in dominating the whole storytelling process.

The whole scenario session with two storytelling sessions and two brainstorming sessions lasted for one working day. One Storytelling Group session lasted two hours during which the participating experts created a story. The stories were coherent in their form, structure and content.

However, it is necessary to have enough resources between the workshops in order to refine the scenario stories and to prepare the next workshop. It was quite time taking to transcribe the results of the storytelling and

brainstorming sessions to coherent scenario stories. For one researcher this took about one week of full-time work. On the other hand, the stories created with the Storytelling Group method were already structured in a chronological form with an interesting plot. This advantage became clear when comparing stories to the results of the ordinary brainstorming session that did not provide any basis for a literary storyline. Interpretation of the brainstorming scenarios took about twice as much time as the interpretation of storytelling scenarios. Moreover, the interpreter had to make up 'a story of his own' to complete the other story that was created the brainstorming session. This means that one extra layer of interpretation was added on the brainstorming scenarios when comparing them to the storytelling scenarios.

### **Project Planning Game vs. Delphi**

Our application of the Project Planning Game was not anonymous. However, the main advantage of anonymity in Delphi is not the anonymity itself but its consequences to the biasing effects of power. We observed that because our Project Planning Game activated participants in a playful way, the effect of hierarchical power structures between the players diminished. Moreover, the openness of the playground – the blank game board – creates an impression that the results are attained through a self-organizing collective process. We see this as an opposed setting to a game where individuals are competing about the result that suits best only to themselves.

Also, in our game the facilitator was able to prevent hierarchical power structures and strategic manipulation by challenging the moves of a gamer and showing their strategic content to the other players. The strategic actions of players were more visible to others, and instead of treating them as obstacles to the collaboration, they were questioned in a playful and humorous way.

The iterative characteristics were explicit in several phases of our exercise. During the playful Project Planning Game the information security issues were analyzed the first time when identifying them in the stories, the second time when selecting and filtering them, the third time when grouping them on the game board and the fourth time when giving points to them. In addition, the player had several times a chance to make changes on the game board and to the issues. A more meta-level iterative characteristic can be seen in the set-up where the future is first imagined and then analyzed.

Based on the experiences it would be reasonable to organize one more workshop to discuss the identified trends, risks and opportunities further. In our case, the results included many information security issues that needed to be further analyzed, filtered and categorized after the workshop.

The feedback in the game can be analyzed at least in two different dimensions. First, we can pay attention to the feedback that the researchers get from the players. Second, we can point out to the mechanisms that enable the players to get feedback for their ideas. The players have numerous opportunities to reflect their thinking in the reactions of others and to develop their viewpoints forward.

The players gave reasons to their choices when selecting information security issues and positioning them on the game board. Also during the valuation phase, the players presented arguments for their opinions. The participants had a chance of preparing their arguments when writing them down on a paper in the beginning of the game and when other players were playing their turns. Since all actions were followed by a lively discussion, the game board was a result of collective deliberation.

Although the game is specially designed for attaining a common goal, it can also be used to bring out differing viewpoints. We did this with a set-up in which the topic was deliberated in two separate groups. After the game was played, the groups presented their conclusions to each other and analyzed the relevant differences between their resulting visions. These differences provided important material for the researchers when summing up the relevant trends.

The combination of two parallel evaluation sessions lasted for one working day. In this sense, the method is not that time consuming as, for example, the iteration of two Delphi rounds. However, it is necessary to have enough resources between the storytelling session and the Project Planning Game to prepare the stories for the analysis.

The results of the Project Planning Game were already in a highly processed form immediately after the session. It was quick to transform the categories and values into a table form to show the importance and the characteristics of each identified issue.

### **Design Games and General Requirements**

We think that weak signals can be traced with the Storytelling Group and with the Project Planning Game because they provide an atmosphere in which unordinary and preliminary ideas can come out. The atmosphere erases power structures and conventions about appropriate ways of thinking and communicating. Moreover, a playful environment encourages



the participants to play spontaneously with their ideas and present even unordinary viewpoints to other players.

In our case, we observed that different weak signals were constructed into the resulting scenario stories also implicitly. It looks like the information security specialists built emerging information security issues into the stories without paying special attention to them. This became evident when the participants analyzed the stories in the second session. The different information security issues identified in the stories seemed to be endless. Our interpretation is that the scenario stories absorb the tacit knowledge of the specialists.

Our experiences confirm the presumption that it is essential to make sure that the participants in the scenario building and evaluation game represent widely enough the relevant stakeholders. Otherwise important viewpoints might not be discovered. It is also important to have visionary thinking in the group in order to get beyond common truths.

We observed that our game-like methods had a direct impact on the participants. The players were happy about their experiences and the approach provided them with a firsthand contact with the work of the researchers. They also had a chance to access the actual results of the research work even before the final reporting of the project.

The process should also have an effect outside, i.e. to the makers of the future. This indirect impact is much more difficult to evaluate and to guarantee. The methods do not provide immediate mechanisms for communicating the results forward to the decision-makers or business people. However, they produce readable, rich and interesting scenarios that are easier to communicate to the wide audience than purely technical scenarios.

## CONCLUSIONS

The two design games fit well to the methodological requirements discussed in the futures studies. Especially we want to emphasize the cost- and time-saving properties of these methods.

Of course there are also limitations in the methods. They have not been tested widely and it requires special competence from the organizer to run them properly. The process does not provide anonymous conditions for expert evaluation either. However, we see that the actual requirements that have been usually pursued with anonymous procedures can be attained with other features that are specific to design games (e.g., playfulness). In addition, we want to put emphasis on the role of the facilitators in the games. They can re-structure existing and emerging power configuration in

the game by making the positions of the players explicit and by challenging their possible strategies.

Our empirical experiences show that design methods provide important advances that make them tempting to the futurists who are searching for improvements in their traditional research methods. We discovered that game-like methods are advantageous in bringing new ideas and weak signals under a collective discussion. Simultaneously, our game-like approach gives a critical layer fulfilling the needs of Reflective Design ideology (Sengers et al, 2009). **Virhe. Viitteen lähdettä ei löytynyt.**

Our experience already provides good grounds for improving the methods. However, we find it reasonable to apply the method also in other kinds of design and foreseeing projects. Different applications would produce comparable results on the usefulness of the method.

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# Concept design for a collaborative digital learning tool for film post-production

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## ABSTRACT

*This paper considers how and in what form a collaborative digital learning tool can contribute to the training of trainees in the field of film post-production. A concept design for such a tool is presented. The concept design was the product of a series of collaborative investigations, and the initial findings of these investigations are reported. The initial findings suggest that such a digital learning tool has the potential to qualitatively improve how training is offered in the complex field of film post-production. The proposed digital learning tool seeks to combine the in-depth training associated with university-based training programmes, with access to a broad range of resources contributed by expert film practitioners, as well as enabling trainees to engage directly with such expert film practitioners. Post-production is not a routine practice that can be followed in a step-by-step manner. Experts in this field are characterised by their creativity and flexibility in being able to adapt the post-production process to the particular requirements of each film production. Such experts have an invaluable contribution to make to the training of the next generation of professional film practitioners. The concept for the collaborative digital learning tool presented in this paper was designed in close collaboration with such experienced film practitioners, in order that their knowledge and experience can be made directly accessible to trainees in the field. The paper identifies design challenges, discusses the applied participatory design methods, and illustrates how the design challenges identified were addressed through visualization and the design concept.*

## KEYWORDS

*Post-production, Film, Collaboration, Digital tool, Learning*

## INTRODUCTION

Today even film experts have a hard time keeping pace with developments in digital film technology. This paper describes a concept for a digital learning tool for use in relation to film post-production, and how such a tool could provide detailed interactive visualizations of the digital production process, a range of digital learning resources, and the opportunity to engage directly with expert film practitioners.

The post-production process in digital film production involves a range of skills in which all practitioners need to be proficient. Trainees (novices and beginners) need to acquire, in addition, the flexibility to apply these skills to the particular requirements of each project. It is this ability, above all, that characterises the difference between experts and trainees in the field of film production. Trainees can gain an intrinsic understanding of the skills required through practice and collaboration with experienced, expert colleagues. However the time available to such experts to act as mentors, advisors and collaborator is limited, constrained by the demands of their professional careers and the budgets available within university film departments to fund their participation.

Task-related visualizations can compress extensive data and complicated information, which allows a range of processes to be made accessible to a wide range of practitioners. However, Tufte (1990, 2002) advocates the creation of high-density designs to allow viewers to select, narrate, recast and personalize data for their own use. Standard Gantt charts, for example, tend to be analytically thin and simple, thus lacking substantive detail (Tufte 2002). Visual clutter and confusion can be understood as failures of design. The collaborative capacity of social media tools, such as wikis, blogs and online forums, create the possibility for trainees and experts to participate in creating data-dense and more accurate visualizations of film production processes such as post-production.

Chen and Bryer (2013) argue that agenda-driven social networks can make a significant contribution to learner-centred learning, an approach that encourages the active participation of learners in their education. They suggest that open social media can provide students with access to a considerably greater range and quality of information and experience than can be made available within a closed teaching environment.

The current generation of film production trainees are the first generation to have grown up in a digitally connected environment that facilitates social learning. Social networking technologies (social media) have created learning environments, where experts can act as role models, facilitators of

effective collaboration, and mentors. This has led to the creation of learning networks that can boost the learning of generic skills that are necessary to a professional career.

In considering how digital tools and visualization can support training in film post-production, we addressed the following research questions:

- How can trainees, who are able and willing to participate in the creation of new film-related knowledge, be enabled to become proficient in film post-production through the use of digital tools and visualization?
- What kind of digital tools can promote collaborative and interactive learning by trainees?

The specific task was to design a concept for an internet-based interface and learning tool for use in the Film Department of Aalto University (ELO) in 2010–2011. This took place in the wider context of the research project *Visual innovations for inclusive projects with diverse participants* (VIPP; Raike 2010), which in turn followed the *CinemaSense* project (Raike 2006; Raike & Hakkarainen 2009).

The design team consisted of designers with backgrounds in programming, graphic design and media production (Keune, Lindholm and Mutttilainen, co-authors of this paper, and the visual designer Martti Arvilommi). The team was joined by Jussi Lohijoki (a post-production workshop expert) and Anna Heiskanen (a film and television production lecturer). Lohijoki later acted as a ‘design participant’ and Keune as a ‘design informant’.

## DESIGN CHALLENGES IN FILM POST-PRODUCTION

Film post-production is a data dense process. The ‘post-production’ process of film production usually starts after the shooting of the film material. However, the planning of post-production often occurs during pre-production when, for example, the budget, as well as the resources and the equipment to be used during filming are specified. According to the design participant (Lohijoki, personal communication in November 2010), the post-production process progresses through five main phases: *Original material*, *Offline*, *Online*, *Grading* and *Distribution*. Understanding the differentiation that exists between these phases does in itself present a challenge during post-production training. The process does not necessarily progress linearly from one phase to the next, but may include project specific iterations that may be perceived initially as contradictory by trainees. Additional phases may occur simultaneously without a defined start or end, such as the creation of sound, music and visual effects. For trainees, this often poses time management challenges. Experts in post-

production are characterised by the ability to create an organized mental image of the flow of the post-production process, and the flexibility to adjust to project specific conditions. Such flexibility is particularly important, as the post-production process is not the same across the film industry.

The process by which experts convey their accumulated knowledge and experience to trainees may take different forms at each stage of the training programme. Experts are at each stage expected to provide guidance on how trainees can learn the skills associated with that particular stage, creating opportunities for, and encouraging trainees to, ask questions and explore their ideas. Experts are required to monitor and record the progress of trainees at each stage of their training, identifying at regular intervals the competencies that trainees have learned and those that remain still to be learned. It has to be recognised that expert tutors can only give a limited time to such training programmes. It therefore follows there can be no guarantee that each trainee will satisfactorily complete the training programme (Heiskanen, personal communication in 2010).

It is reported that trainees gain a feeling for, and knowledge of, information and communication strategies, information design, the process of envisioning information, best practices and teamwork, from practice and subsequent personal experience (Ehn & Badham 2002; Nelson & Stolterman 2003; Tufte 1990; Wenger 1998). In post-production, the topics addressed include information communication strategies, best data backup practices, and how to proceed when material is filmed with incompatible mixed media or under a number of different lighting conditions, causing parts of the film material to differ. Moreover, crucial decisions may have to be made during post-production that alter the flow and budget of the overall process, especially during the original material phase. Challenges such as these are likely to have been encountered and solved by experienced practitioners, such as alumni of the same film study program and other professional film practitioners. Trainees need to learn directly through collaborative work with such experienced practitioners, as well as through trial and error in undertaking independent projects. This dual approach creates excellent learning opportunities, and enables the trainees to develop flexibility as they progress, but is also a time consuming method of training, and does not usually occur to the extent that film educators would wish.

## METHODS AND DESIGN ACTIVITIES

The design process followed a four-phase iterative and research-based design approach, which considers design to be a major outcome of research. (Leinonen & al. 2010): (i) *Contextual Inquiry*: the purpose of this first phase is to understand the context to be addressed by the research i.e. the context in which the application will be used; (ii) *Participatory Design*: this involves obtaining input from the potential users of the design (Ehn & Badham 2002); (iii) *Product Design*: the creation of prototypes that can mediate design ideas between the designers and the potential users; and (iv) *Software as Hypothesis*: the development of functional prototypes.

The main research activities undertaken to understand the context took place during a workshop attended by the designers and the collaborators. In the initial workshop, artefacts created by the collaborators, such as concept maps (later ‘C-maps’) of the post-production flow process, visual interface prototypes, and a draft version of a post-production manual, were used as a means to identify and clarify initial questions.

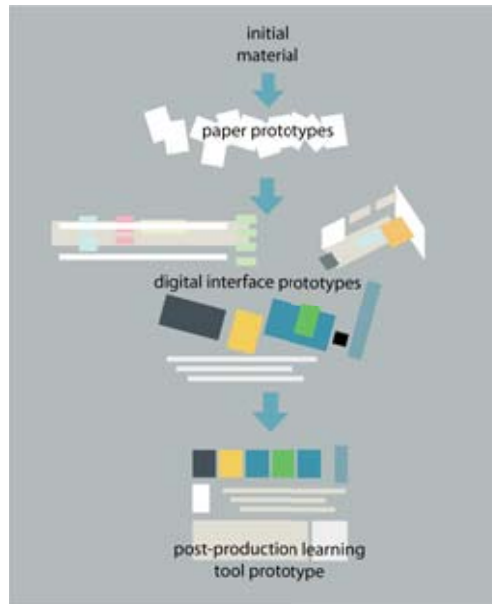
Four 2 to 3 hour long participatory paper prototyping sessions were held involving the designers and the design participants. As the design team was small, all designers participated in these sessions, which facilitated information sharing throughout the design process. During the sessions, the initial information was discussed, using the prints of the C-maps (Figure 2), the interface suggestions, and photographs of early whiteboard drawings as inspiration. The designers used coloured pencils and adhesive notes to map each stage of the post-production process on a large sheet of paper. At the last prototyping session further design recommendations were made. The sessions provided an in-depth contextual understanding of the post-production process and identified design challenges and opportunities to be addressed.

The artefacts that resulted from the paper prototyping sessions were used as the basis for the next design stage, which was conducted without informants. This included the visual design and programming of an interface prototype. During the visual design activities, the initial paper prototypes were analysed and redesigned through iterative visualizations. Based on this visual design, a HTML and CSS software prototype was developed, which allows basic interactions to be carried out, such as colour changes. The close collaboration established between the visual designers and programming designers during the earlier phases of the project facilitated communication during this crucial phase of the design process.



## VISUALIZATION: DESIGN OPPORTUNITIES AND RESULTS

In addressing the design challenges, three main design tasks were identified: (i) visual representation of each phase and the key components that comprise each phase; (ii) visual cues for project specific information; and (iii) peer documentation of expert knowledge. These design tasks informed the design of the learning tool concept. Figure 1 illustrates the artefacts used in the creation of the prototype post-production tool.



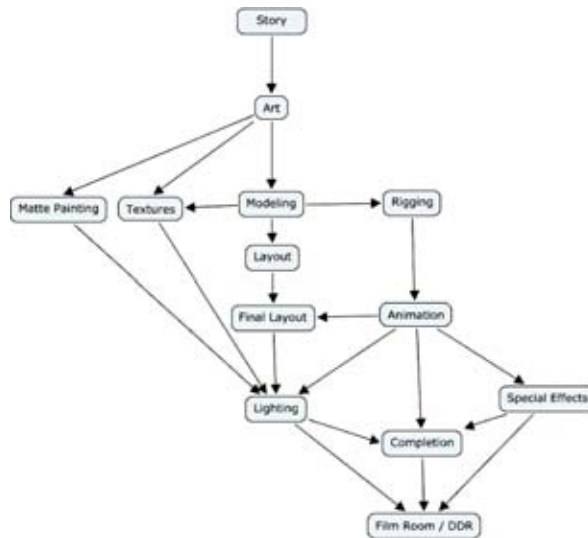
**Figure 1: Illustration of the artefacts created during the design process by Jussi Mutttilainen.**

We recognized that the inclusion of a timeline would provide a useful means of visualising the post-production process. In the process of creating the paper prototypes we were able to identify the key steps that needed to be visually represented on the timeline. In designing more dynamic digital interface prototypes, we were able to identify and create visual cues for project specific information. The design of the prototype post-production learning tool enabled us to determine how we should document expert knowledge.

### The visual representation of the phases and key steps

The visually rich material, in particular the C-maps created with the IHMC CmapTools software (Figure 2), that the expert collaborators provided, proved to be inspirational input during the design process. These artefacts enabled us to recognize that the timeline visualization of the main phases of the process would support the learning of the post-production process by

addressing difficulties experienced by trainees, in particular their conception of the overall post-production process.



**Figure 2: The expert concept map of the animation process by Deepa Agarwal.**

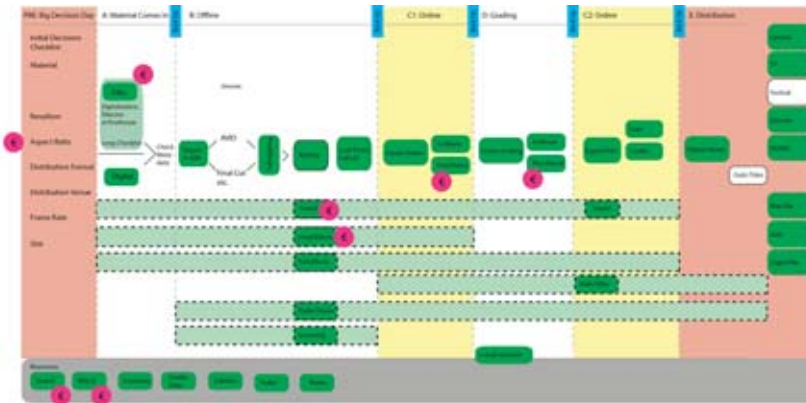
The first participatory paper prototype workshop resulted in a note based paper prototype (Figure 3) that visualizes the main phases of the post-production process. The prototype was used to discuss, clarify and organize the main phases with the participant, using differently shaped and coloured paper notes. As a consequence of several design iterations of the paper prototype in collaboration with the participant, we removed excessively detailed descriptions of steps and optional software recommendations. Although the duration of different phases varies considerably (e.g. the online phase takes longer than choosing the production medium at the start of the process) the duration of each phase is represented equally. During the iterative paper prototyping, key steps and decision-making points were identified and included. Examples of these include checking the flawlessness of the metadata after the film has been digitized, and visual cues for budget management and for creating data backups. The backup reminders occur with important project milestones, which enables each phase to be clearly demarcated. Figure 3 shows the phases in the form of diamond shaped notes.

The creation of the paper prototype enabled the ‘trainees’ to gain an in-depth understanding of the project context. This suggested that the phase visualization could serve as an appropriate representation of the post-production process for the navigational interface of a digital learning tool. The phase visualization shows the most important phases and all concurrent steps in one representation.



**Figure 3: The paper prototype of the phases created by Matti Arvilommi.**

Based on the paper prototype, digital interface prototypes were created by members of the design team (Figure 4). It was agreed that a) the learning tool should visually differentiate sequentially fixed post-production process phases from those that may shift and overlap and b) the tool should enable trainees to arrange the latter in accordance with particular project requirements. This personalized visualization capability was considered also to have the potential to support individual reflection by trainees, enhance communication, and facilitate collaboration with experts.



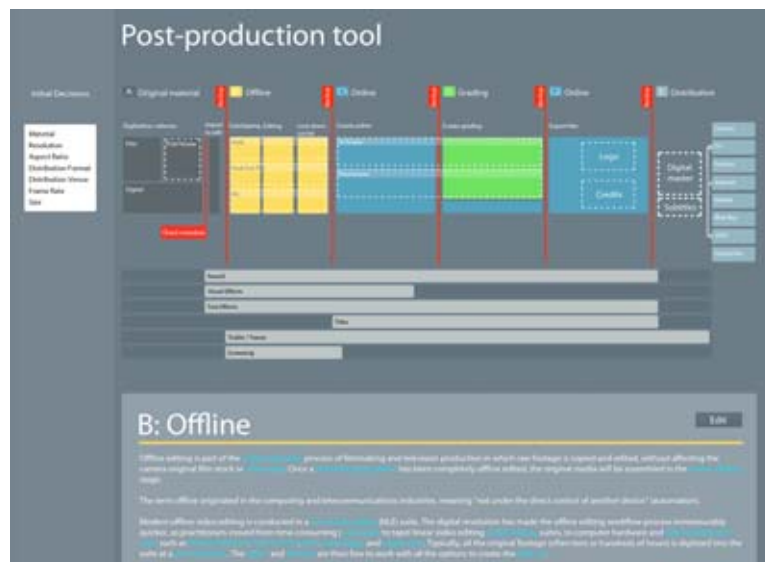
**Figure 4: A prototype illustration of the digital interface by Matti Arvilommi, Anna Keune, Björn Lindholm and Jussi Mutttilainen.**

To support trainee's in developing good data backup practices, visual cues were included that remind trainees at important milestones to create backups. In relation to project budget planning, it was recognized that trainees need to be able to enter budget updates, change the budget in the interface, and receive immediate feedback on the budget implications of a path change. It was agreed with film production experts that budget related information should be transparent and accessible to all team members.

## Peer documentation of expert knowledge

Based on conversations with the design participant, it was agreed that expert knowledge should be linked directly to the post-production phase that it addresses. The idea was to enable trainees to browse through expert commentary on issues relating to each specific phase.

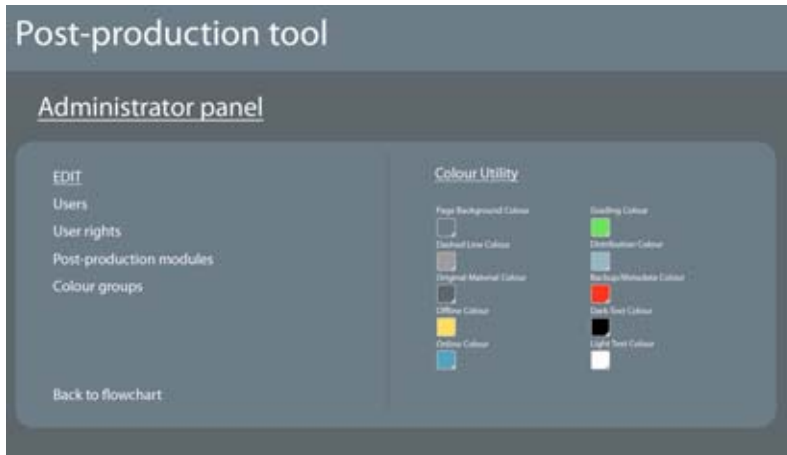
The post-production phase visualization is complemented by a *wiki* space, for film practitioners to view, edit and add information or examples relevant to a particular phase (Figure 5). In order to encourage the participation of practitioners, the wiki can be edited by anyone. The use of HTML allows, for example, integrating open source project content, such as that to be found on *Wikipedia*. Combining the phase visualization with a wiki allows the editing of information in context. By moving the mouse above any of the post-production phases, a hovering window presents a short description of the phase and its requirements. Clicking the phases offers a more elaborate description and explanation. The wiki loads under the visualization without reloading the page.



**Figure 5: An interface concept illustrating an example project by Björn Lindholm and Jussi Muttillainen.**

Although not functionally implemented, a visual mock-up of an administrator panel for the wiki was designed (Figure 6). It was considered important to include within the administrator panel the facility to edit information in context. Figure 6 also illustrates a second administrative tool, that of *Colour Utility*. *Colour Utility* is a simple colour selection and grouping tool, through which the colours of the interface can be changed.

This facility allows each phase, step, repetition and key step of the post-production process to be distinguished by a different colour.



**Figure 6: The visual mock-up of the administrator panel created by Björn Lindholm and Jussi Mutttilainen.**

This categorization by colour coding allows interrelationship to be made visually evident e.g. the steps involved in a particular phase, repetitions, and distinguishing between an actual activity and additional information about that activity. Administrators can change the colours of any group. *Colour Utility* was developed with jQuery, a JavaScript library, to allow instant feedback on selected colour changes upon refreshing the page. A colour swatch grid with a limited selection of colour choices opens upon selection. Additional colours can be added with standard hexadecimal codes. *Colour Utility* was designed as a separate module that can be bound with HTML pages that use standard Cascading Style Sheets (CSS) for colour definition. At this time not all functions of the *Colour Utility* tool are fully developed, and work is on going on the prototype.

## DISCUSSION

We recognized the clear need for other project specific information, such as progress, dependencies, and deadlines. In order to support collaboration between learners, a function that generates a pathway through the interface, highlighting the stages and possible dependencies, and allowing the updating of project progression, was conceptualized (Figure 7).

Through such a personal project pathway, the effects of early process decisions could be visualized; enabling trainees to compare how changing particular variables could affect outcome media, the project budget and the project completion schedule. In order for the project path to appear, the

distribution channel, film material, resolution, aspect ratio and tools to be used, have to be selected. It was conceptualized that, as the project progresses, learners would be able to update the state and schedule of specific, simultaneous and flexible phases of the project by horizontally moving the phases that are illustrated as blocks under the main production diagram (Figure 7). The use of the visualization facility allows film team members with different roles to recognize if a phase of the project requires their involvement.



**Figure 7: Clipping of post-production interface with conceptual project pathway by Björn Lindholm and Jussi Muttilainen.**

The design participant proposed that the repository of the collective knowledge should be accessible to anyone who is interested. This would, in the view of the design participant, encourage more experts to participate (Lohijoki, personal communication in August 2011).

## CONCLUSION

The design team, and Aalto University's Film Department with whom the team closely collaborated, view the post-production learning tool prototype as a potential free and open public repository, for use in particular by academic and industry based film practitioners. Aalto University Film Department have suggested that the collaborative building of the knowledge repository could present opportunities for strengthening ties between the Department's staff and students, and that alumni of the Department could continue to be beneficiaries of the repository long after their graduation.

The design concept presented here could add considerable value to university based film post-production training, if further developed into a functioning prototype. The design participant, the design informant and Aalto University Film Department collaborators share this view. We therefore encourage anyone who shares our interest to build on the concept design and ideas presented in this paper, to develop a functional tool that addresses the challenges involved in enabling trainees to become qualified professionals in the field of digital film post-production.

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# A Provisional Theory of Agile Design

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## ABSTRACT

*This paper summarises work in progress on aligning Design Thinking to Agile approaches to design and development. An overview of both is presented; suggesting a theoretical framework for understanding the distinctive characteristics of each, as a theory of design practice and artefact consisting of four foundational principles. These conclusions are then contextualised within contemporary design practice which is characterised by highly collaborative working with a focus on new product and service development. The paper concludes by summarising a case study based in a small creative agency where Agile methods were being adopted. The case suggests Agile provides an effective way of working, in creative as well as technical projects. In addition, the case points to the potential for aligning creative and technical agile principles to build hybrid tools and methods; that combine the cooperative affordances of Agile with the innovative ones of Design Thinking.*

*Keywords: Design Thinking, Agile methodology and Innovation*

## INTRODUCTION

While still relatively young, Agile is becoming a popular approach to designing and delivering interactive products and services. As a technical development approach, Agile does not prescribe process or tools, but is rather an open-ended collection of principles and methods. Despite being heterogeneous, Agile principles, as embodied in its manifesto, suggest it embodies a set of values that (Beck, K et al, 2001) extends input, activity and responsibility across teams in short, focused delivery cycles (sprints) and intensive collaborative practices (scrums) to deliver artefacts that are in a continual loop of iteration (see Rodríguez et al, 2012).



## ***The Agile Manifesto***

Individuals and interactions over processes and tools  
Working software over comprehensive documentation  
Customer collaboration over contract negotiation  
Responding to change over following a plan

Agile as a distinctive approach, emerged from the Extreme Programming movement in Software Development (Layman, 2004) and Lean Manufacturing (Womack et al, 1990) which gives it a distinguishing character, which is to some degree at odds with both traditional design practice and Design Methods (Jones, 1990) that are generally procedural rather than focused on iteratively developing a Minimum Viable Product. While many studies have investigated the work context of technical Agile projects, including the efficacy of its working methods, proclivity for collaborative work and flexibility in adoption (e.g. Fitzgerald et al, 2006); few have looked at the approach from a more design oriented perspective, especially in the context of developing new products and services.

Studies that do begin to tackle this subject (e.g. Nielsen, and Madsen, 2012) have mixed conclusions, but generally note a concern that design research is compromised and that Agile overemphasizes technological factors. Arguably, critiques of Agile miss the key point; that the collaborative nature of the approach is a fundamentally different way of doing design. Some work in aligning the two approaches has been done, however, including Ratcliffe, and McNeill (ibid). At a more practical level, the many tools and techniques used by Agile practitioners align well with the needs of designers. In conclusion, this paper attempts to move this work forward by providing a provisional theoretical framework for progressing further.

Achieving a workable synthesis or at least accommodation of approaches is not only of practical value. Understanding the underlying principles and embodied beliefs manifested in design and development processes, such as Agile, sheds light not just on their own characteristics, but more usefully on cross-disciplinary approaches to solving fundamental issues that affect a range of design domains including how teams work together. For example, comparing 'Design Thinking' (Cross, 1982) with 'Agile Experience Design' (Ratcliffe, and McNeill, ibid) suggests that both are tackling similar and related issues about design work and the products of design activity. Furthermore, both have developed an understanding of the problem and potential solutions from entirely different contexts: Cross (ibid, 91 - 114) from observing design teams and Ratcliffe, and McNeill (ibid) from the pragmatic world of software development that can be summarised in the following table:

<b><i>Design Thinking - issues</i></b>	<b><i>Agile – methods and tools</i></b>
Roles and relationships	Cross functional teams
Planning and changing activities	Estimation/Pivot
Gathering and sharing information	The Wall/Stories
Generating and adopting concepts	Minimum Viable Product
Avoiding and resolving conflicts	Models/Scrums

### ***Design Thinking***

To some extent, Agile presents a challenge to traditional Design Thinking perspectives, as its highly collaborative nature distributes activity including, thinking, across individuals and teams. In this context, the elements of Design Thinking exist at both an individual and social level which to some level is counter posed to cognitive and ‘practice-based’ accounts that focus on early design work on tangible products. Lawson (ibid, p. 49) argues that the activity of design is recursive and that it encompasses four frames of thinking, consisting of the problem; analysis, synthesis, solution and evaluation. This view is supported, to some extent, by Stempfle and Badke-Schaub (2002) whose empirical study points to four analogous cognitive processes comprising of generation, exploration, comparison and selection. To summarise these models of design suggest that there is recursion between:

**Analysis** – focus on the problem, requirements, constraints and opportunities

**Ideation** – focus on solution, generating ideas and creativity

**Evaluation** – focus on assesment, rationalising, comparing and synthesising

While empirical evidence supporting ‘Design Thinking’, as a distinctive quality of creative activity exists, there is clearly an overlap between disciplines in tackling these issues. In other words, design as a distributed activity, means that researchers, designers, programmers and even project managers are all involved in analysis, ideation and evaluation at many junctures. When design activity is dispersed, the interaction between parties rather than individual cognitive processes become critical. Anecdotally, the challenges in this area rest on three key cooperative functions:

**Communication** – how do teams jointly communicate best?

**Collaboration** – how do extended teams work best together?

**Decisions** – how are decisions best made within extended teams?

## THEORETICAL FOUNDATIONS

Agile frames design as an activity that spans ideation to implementation within multidisciplinary teams and positions the outcome of design and development as a provisional artefact that is continually iterated upon even after release. Close reading of Agile principles is instructive in explicating it as a distinctive design approach and the value it holds for the design community.

### ***Individuals and interactions over processes and tools***

Agile is a loose collection of methods and principles opposed to a prescriptive methodology. The approach emphasises the autonomy of individuals and working groups and focuses on supporting the quality of collaboration between parties. The focus on practitioners' teamwork, rather than mandatory adoption of process and tools suggests that the outcome of design and development is not arrived at through procedure but is to some extent emergent through an extended interaction with multiple parties. As a theory of design, Agile proposes that it is distributed; the outcome of autonomous teams with the power to make decisions together and manage how they work.

Agile Design Principle 1 – Design is co-creative

Agile Artefact Principle 1 – Deliverables are emergent

### ***Working software over comprehensive documentation***

Traditional waterfall development approaches are founded on separating specification and deliverable. The rationale for such 'up front' documentation that is central to waterfall, is that a comprehensive set of requirements are needed before design can efficiently progress. In contrast, Agile emphasises developing working software as early as possible partly on the understanding that manifesting a partial solution early on will help to steer later work. In this sense, in Agile the product of design is provisional rather than finalised. This means that design is not just distributed among a wide set of individuals but is also dispersed over time. From a design perspective, running projects in sprints to deliver discrete releases supports a key quality of Design Thinking; it enables teams and individuals to pause and reflect not just on progress but on their work as it evolves during the lifecycle.

Agile Design Principle 2– Design is socially reflexive

Agile Artefact Principle 2 – Outcomes are always provisional

### ***Customer collaboration over contract negotiation***

At the extreme end of collaboration teams include the client themselves or by proxy through a Product Owner. The rationale for widening team membership is that it increases efficiency as decisions can be made more easily and quickly and with earlier visibility of all dependent parties. Agile, frames design, not as the outcome of a committee or individual, but as collaboration with an inclusive set of stakeholders. Implicit to this view is that the outcome itself embodies the negotiated agreements of what the deliverable is between parties rather than externalized through contracts and the traditional notion of the design brief (Phillips, 2004).

Agile Design Principle 3 – Design is a widely inclusive activity

Agile Artefact Principle 3 – Artefacts embody contractual negotiation

### ***Responding to change over following a plan***

Waterfall approaches are based on a bounded scope of deliverables that are produced through a prescribed set of activities. Agile by contrast emphasises iterative cycles that adapt to change. The rationale for integrating change within design and development is partly based on mitigating the risk of building to early ill-defined and inflexible requirements that are likely to need modification. The idea that the products of design are mutable and are only fixed at the end of the production cycle is a contentious one in the world of products. In this sense, Agile, as a theory of design is one where iteration, even beyond production never ceases as opposed to being a discrete activity at the beginning of the product/service lifecycle.

Agile Design Principle 4 – Design in endlessly recursive

Theory of artefact – Deliverables are mutable – beyond the project

### ***Agile as a distinctive theory of design and artefact***

#### ***Design Theory***

Co-creative – A distributed activity involving clients and practitioners

Reflexive – An iterative process of doing and reflecting

Inclusive – Accommodates a wide set of stakeholders

Recursive – A continuous process of improvement

#### ***Artefact Theory***

Emergent – There is a dialogic relationship between outcome and activity

Provisional – Artefacts manifest partial solutions at any point in time

Contractual – Deliverables embody contractual agreements

Mutable – Outcomes are amenable to change

Having attempted to uncover the underlying values of Agile in terms of a design activity that produces outcomes, it is worth developing the analysis in the context of creative practice.

## METHODOLOGY AND DATA

A study was undertaken to explore the differences between traditional waterfall approaches and Agile with a focus of building and testing theory (see above) in the context of a creative agency focused on innovation. The study was conducted at a small company ( $n = <50$  employees) in 2012, that included a multidisciplinary team ( $n=10$ ) of designers and developers, that used a range of tools and practices to deliver new digital products and services.

The choice of research methods and analysis in the case was pragmatic as an opportunity arose quickly where two projects were ending and experiences were still fresh and easy to remember. The case is based on a comparison of two comparable projects which shared the following attributes:

**Client** – both projects were commissioned by similar sized organisations ( $n \leq 100$  employees) with comparable levels of domain knowledge, technical expertise and relationship to the agency.

**Sector** – both clients operated in the same sector with similar business goals.

**Deliverable** – the outcome for both projects was a tablet application with the goal of showcasing the client's products and services.

**Technology** – both projects utilized comparable technologies and the operating systems involved in the two projects were identical.

**Team** – the project teams included the same roles and individuals on both projects, there was an additional developer on the Agile project.

**Complexity** – both projects were comparable in terms of levels of challenge and difficulty both for client and agency.

**Goal** – both projects sought to deliver a technically robust and innovative new product to market.

### ***Waterfall project***

The first project was delivered using a traditional waterfall methodology. Project requirements were elicited through workshops, one focusing on business goals and another on technical issues. Outputs from these workshops informed the creation of a requirements document that specified all relevant aspects of the end deliverable. This document was

iterated throughout the project and became the primary method of communication in the team. The document included technical descriptions as well as template designs and was a reference point for subsequent design and development work.

Production work followed and progressed at increasing levels of fidelity from sketches, to wireframes then to visual design and finally to development and build. Each of the design phases was documented so that team could review and work to produce what was needed for the next stage. This meant that the documentation had to convey detailed level information and in manner that the wider team could easily understand.

### ***Agile project***

The second project was delivered largely using an Agile approach. As with the waterfall project, two workshops were convened for requirements at a business and technical level. Unlike the previous workshops early designs were used to stimulate discussion and feedback. Rather than producing a detailed specification, the sketches formed the basis of a low-fidelity prototype that was used to communicate the requirements to the client and project team. Scrums took place daily throughout the project and generally reduced the need for longer meetings. Unlike the waterfall project, the agile one dispensed with documentation almost entirely and progressed through a series of working releases that both communicated the specification to stakeholders and involved all of the project team to produce together at each iteration. Both prototype and working releases supported negotiation of changes to requirements and adding new features and were used for reviews and retrospectives.

### **Comparing projects**

An initial project review elicited team feedback on what had been learned from the two projects. In addition, an online questionnaire was used to fathom the differences between the two projects more deeply. Analysis of the data focused on identifying and validating underlying categories. For example, a cluster of data from both workshop and questionnaire emerged from analysis that centred on increased collaboration. Overall the findings support Agile as aiding collaboration in a creative context as well as a technological one (see Rodríguez et al, 2012) in line with the principles outlined above. The findings of the case are categorized within four dimensions that suggest the benefits of an Agile approach to creative work comprising:

#### **Co-creative – Working together**

Perceived reduction in effort in general and better and clearer focus

Belief of more even distribution of work with greater involvement across

disciplines

Feedback on more clearly defined roles and responsibilities and reduced conflict

### **Reflexive – Learning together**

The sense that there was more effective and informed decision-making

Increased involvement in process improvements

Perceived reduction in ‘production’ effort and greater ‘thinking’ time

### **Inclusive – Progressing together**

Feedback that knowledge sharing throughout the lifecycle improved

Reported clearer sense of direction and cohesiveness – common goal

The sense that engagement had increased within the wider project team

### **Recursive – Improving together**

Respondents noted better visibility of deliverable – reducing uncertainty

Perceived reduction in reworking and increase in reuse of resources

Feedback supporting better scope management and clarity of requirements

Belief that Agile improved quality assurance

## **CONCLUSION**

While Agile has emerged from a ‘non-design’ discipline it embodies a set of beliefs, principles and theories about what design is and how it manifests itself that can be characterized thus:

Co-creative – A distributed activity involving clients and practitioners

Reflexive – An iterative process of doing and reflecting

Inclusive – Accommodates a wide set of stakeholders

Recursive – A continuous process of improvement

While further research is needed to validate these findings, they provide intriguing insights into the potential evolution of both Agile and Design Thinking approaches – to theory and practice. The principles suggest that the Agile potentially aligns with many of the fundamental issues faced by a range of design disciplines. Fundamentally, as a highly-cooperative way of working, the approach enables teams to deliver more effectively by accommodating a widely distributed set of. In addition, collaboration is framed by reflexivity that is integral to design and review cycles which enable informed and inclusive decision-making among the wider team, including clients. By focusing on iteration and continuous improvement, Agile working is typified by a strong sense of quality assurance balanced against a powerful and negotiable constraint at regular checkpoints – what can be delivered on time, cost and quality. Design Thinking, on the other

hand, provides a useful model for augmenting effective collaboration with innovative and creative practices holding the potential for hybridization for the benefit of both disciplines and domains.

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# At the heart of collaborative 3-D virtual team work: The impact of visual biofeedback to social presence in computer-mediated communication

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## ABSTRACT

*The importance of social presence in effective team work has been widely acknowledged. Among the forms of computer-mediated communication tools that virtual teams utilize it has been suggested that 3-D virtual environments could enhance the feeling of social presence due to shared space and avatars. However, there is still a need to find new ways in creating social presence since results have been inconsistent regarding the virtual environments' ability to create social presence better than other forms of computer-mediated communication. Emotions, psychological involvement and behavioral interdependence are involved in social presence which makes this phenomenon possible to study with psychophysiology. In this study it is asked if social presence in virtual environments could be enhanced with visual biofeedback which is produced of the physiological measurements conducted to the virtual team members during collaboration. Also the effect of task type to perceived social presence was studied. The results showed that the existence of biofeedback did not create stronger feeling of social presence as was assumed. However, varying the task types had an effect to the perception of social presence. Despite of the perceived challenges this study acts as a promising pilot in enhancing social presence in virtual work with biofeedback.*

## KEYWORDS

*Virtual team, virtual environment, social presence, biofeedback*

## INTRODUCTION

Virtual teams are a solution for the increasing need for innovation in global work life. Virtual teams enhance more diverse participation which enables different combinations of expertise and sharing best practices of work (Lipnack and Stamps, 2000) – matters that are also crucial requirements for innovation (Hargadon and Sutton, 1997). Computer-mediated communication is the main channel for virtual team interaction (Gibson and Cohen, 2003). It is continuously developing and thus supports successful team work better than before. However, when focusing on the effectiveness of computer-mediated communication the social aspects of interaction are easily forgotten (Bente et al., 2008).

Among the forms of computer-mediated communication it has been observed that graphic three-dimensional (3-D) virtual environments support social interaction better than distributed video conferences (Redfern and Naughton, 2002). 3-D virtual environments create a sense of co-presence with others in the same space which is a prerequisite to social presence (Biocca et al., 2003). Social presence is an important phenomenon in computer-mediated communication because it enhances communication (Richardson and Swan, 2003) and satisfaction to interaction (Gunawardena and Zittle, 1997). Social presence in virtual environments can be defined as awareness of the co-presence of another representation of a human and consisting of the experience of connectedness to the psychological and emotional states of the other (Biocca and Harms, 2002). Despite 3-D virtual environments' ability to create the sense of co-presence, there is still a need to study how to access better to other's psychological and emotional states and thus create a stronger sense of social presence in these environments (Biocca and Harms, 2002).

In this study we ask if visual biofeedback could give virtual team members information of the others' psychological and emotional states and thus increase the feeling of social presence. We also ask if different task types assigned to the team have an impact on social presence. It has been recognized that the nature of communication can affect social presence (Tu, 2002).

## SOCIAL PRESENCE IN VIRTUAL TEAMS

Virtual teams enable simultaneous work processes and more effective communication between parties. Virtual teams enhance innovative work practices since gaining knowledge and reaching experts from different fields

is easier (Lipnack and Stamps, 2000). However, effective work that virtual teams enable needs also concentration to the interpersonal relationships in the team. Chidambaram (1996) showed a positive link between socio-emotional processes and outcomes of the virtual team project. Team performance benefits from social interaction; it increases communication effectiveness and enhances the ability of the team members to work together (Chudoba et al., 2005). Engagement among people in a social level relates to the feeling of social presence (Ning Shen and Khalifa, 2008).

Social presence in computer-mediated communication has been defined as awareness of co-presence of another human being in a computer-mediated environment, and consisting of the experience of connectedness to other's psychological, emotional and intentional states as well (Biocca and Harms, 2002). According to the original definition, social presence has been seen as the communication medium's ability to convey social information (Short et al., 1976). Biocca and colleagues (2003) instead see this concept in a more broader sense; as a part of human behavior and emotions. The aim of Biocca and colleagues' (Biocca, Burgoon, et al., 2001, Biocca, Harms, et al., 2001; Biocca et al., 2003) approach to social presence is to create a theory and measure of social presence which does not rely on communication medium's capability of conveying social information but sees social presence as an interaction related phenomenon, and applicable to different computer-mediated situations.

Redfern and Naughton (2002) have noted that there are differences in the feeling of social presence between for example video conferences and virtual environments. Even though video conferences provide a practical space for meetings they do not create a sense of interaction occurring in a shared social space. Instead, graphic 3-D virtual environments allow simultaneous interaction of multiple users with avatars in the same space and thus create a sense of presence among them. Avatar is a virtual character that represents the user in the virtual environment (Jung, 2011). 3-D virtual environments provide an experience of joint shared location instead of feeling being "here" and "there" which is specific to video conferences (Foster and Meech, 1995). One of the most used 3-D virtual environments is Second Life ([www.secondlife.com](http://www.secondlife.com)).

Despite of the suggestion of virtual environments supporting social presence better than for example video conferences the results have been inconsistent. Researchers have not always found differences between the feeling of social presence but video and avatars have created it in a similar amount (e.g. Clayes and Anderson, 2007; Bente et al., 2008). This means that there is still a need to create new strategies to enhance social presence

in virtual environments that take into account information regarding emotions and psychological states of others. With the use of psychophysiology this could be possible.

In addition to developing new strategies to enhance social presence Tu (2002) has recognized that the nature of communication in virtual work affects social presence. According to Tu (2002) the previous studies have showed that social relations, task types, the characters of computer-mediated communication, and participation influence the feeling of social presence. Especially when working with tasks that are social in nature the feeling of social presence is stronger in comparison to conflict or negotiation tasks.

## BIOFEEDBACK IN VIRTUAL ENVIRONMENTS

Information of the user's emotional and psychological states could enhance social presence. This encourages studying how this information could be produced to virtual environments. According to Brugnoli and colleagues (2006) the current communication technologies are still ineffective in mediating emotional and nonverbal cues. However, the measurements of bodily activations allow us to make inferences about emotions, attention, and motivation (Salminen et al., 2010). Psychological and emotional states can be indicated by physiological activation such as heart rate or galvanic skin response (Cacioppo and Tassinary, 1990).

Physiological activation can be utilized to present biofeedback. We define biofeedback as measuring users' physiological activation and presenting this feedback information visually in real time to them during interaction. According to Lombard and Ditton (1997) the feeling of presence has psychological and physiological effects. The effects of presence are shown as physiological reactions such as emotional arousal. With psychophysiology it would be thus possibly recognize the connection between emotional reactions and social presence. We thus suggest that presenting visual biofeedback could enhance the feeling of social presence during virtual collaboration.

Electrodermal activity (EDA) can be used as an indicator of the level of excitement or relaxation (Strauss et al., 2005). Electrodermal activity is often measured with galvanic skin response (GSR). The changes in heart rate (HR) are related to age and health but also to physiological and psychological state. Increase in heart rate occur during purely physical activity such as aerobic exercise but it can also act as an indicator of positive and negative arousal (Blascovich, 2000).

Biofeedback has been used in studies concerning computer-mediated affective gaming. In their study Becker and colleagues (2005) studied the impact of the opponent player's emotional state which was presented as biofeedback to the participant's game performance. They found that the opponent's emotional state had impact to the participant's stress level during the game. In Bersak et al's (2001) study the participants learned how to control their emotions through the presented biofeedback to perform better in the game.

Hudlicka (2009) recommends adding biofeedback to virtual games to strengthen emotional and social aspects of the game environment and also to enhance user experience. These findings suggest that biofeedback might provide a solution to the challenge of conveying information of the users' psychological and emotional states in 3-D virtual environments. However, there is only little research that combines psychophysiology and social presence in 3-D virtual environments. In one of the few studies, Slater et al. (2006) measured the physiological activation of the participants to detect the breaks in presence from the physiological information. In addition to measuring the physiological reactions, our research adds the crucial aspect of visual feedback to the participants during interaction. Also Sallnäs and colleagues (2000) studied the impact of haptic feedback to social presence. They gained encouraging results even though the impact of the feedback to social presence was not statistically significant.

In the study of Salminen and colleagues (2013) the participants received feedback of the average emotional state of the virtual team they were collaborating in among different routine and creative task types. Participants' emotional state was measured with skin conductance and facial electromyography and they were made to believe that their measured physiology acted as biofeedback to the other team members. In reality these measurement were not used to present the emotional state of the team but the team emotions were manipulated by the researchers. The presented emotional state of the team had an effect to the individual team member's emotions. One of the findings of this study also indicated that in creative tasks there were more changes in skin conductance which means that they created more psychological arousal in comparison to routine tasks.

**From the basis of previous research literature we hypothesize the following:**

- 1) When biofeedback is presented to the team, the feeling of social presence is stronger compared to the situation where biofeedback is absent
- 2) The team members' feeling of social presence is stronger during creative tasks compared to routine tasks

## METHODOLOGY

### Participants

In this study there were 36 participants. They were divided in 12 virtual teams of 3 participants in each. Altogether 20 females and 16 were males participating in this experiment. Participants were randomly assigned to the teams. The experimental teams were mostly mixed teams with either 1 female and 2 males (5 teams) or 2 females and 1 male (6 teams). One of the teams consisted of 3 females. All participants were Finnish-speaking. Participants were recruited via student organization e-mailing lists, advertisements in student cafeterias and bulletin boards, and via friends.

### Data collection

#### *Experimental setting*

The experimental teams collaborated in Second Life virtual environment in a distributed manner: the 3 participants in the team were situated to separate test rooms and were connected only virtually. Heart beat and galvanic skin response measurements were conducted to each participant and presented visually to the team during interaction. The participants met face-to-face for the first time in a brief feedback-conversation after the experiment. Picture 1 illustrates the Second Life virtual environment of this experiment.

This was a 2 (biofeedback: on vs. off) x 2 (task type: creative vs. routine) within subjects – design. Virtual teams were collaborating within eight tasks in Second Life virtual environment. There were two different task types named as creative and routine tasks. There were four of each task types (routine tasks a–d and creative tasks a–d). A biopanel that presented visually the participant biofeedback was turned on in every other task starting either from the first or the second task. We also controlled the order effect by varying the task order. Routine tasks included correcting grammatical errors from texts concerning Second Life. In creative tasks the teams were assigned to develop new purposes of use to traditional objects

such as flashlight, hammer and rubber band. Social presence questionnaire was filled out by the participants after each task. The experimental setting was video and audio recorded both from Second Life and from the physical test rooms.



**Picture 1** The experimental setting in Second Life

### ***Psychophysiological measures***

The participants' physiological responses were measured with a wired galvanic skin response and wireless heart rate monitoring devices. Customized GSR measurement platform was developed for this experiment. We measured the skin conductance from the participants' wrist because they had to use keyboard during the entire experiment. In heart rate measurements we used Garmin ANT+ HR belt.

We presented the participant biofeedback in a biopanel that was implemented to the view of Second Life (see picture 1). Changes in skin conductivity were visualized as an up and down arrow. Average heart-rate of the last few beats was shown numerically and as a visual beating heart in the biopanel.

### ***Social presence questionnaire***

Biocca and Harms (2002, 2003) have created a social presence questionnaire from the basis of their theoretical approach to social presence. This questionnaire includes 34 items divided in following dimensions of social presence: 1) co-presence (8 items), 2) attentional engagement (6 items), 3) emotional contagion (8 items), 4) comprehension (6 items) and 5) behavioral interdependence (6 items).

The five dimensions were analyzed separately. The reliability coefficients (cronbach's alpha) were good: 1) co-presence  $r=.92$ , 2) attentional engagement  $r=.79$ , 3) emotional contagion  $r=.88$ , 4) comprehension  $r=.84$  and 5) behavioral interdependence  $r=.93$ . The response scale of this questionnaire was 1–7 (1 = strongly disagree, 7 = strongly agree). After the



sum of variables the response scale changed to 6–42 (6 = strongly disagree, 42 = strongly agree) in the dimensions of six items, and 8–56 (8 = strongly disagree, 56 = strongly agree) in the dimensions of eight items.

## ANALYSIS

The questionnaire data was analyzed statistically in SPSS using Linear Mixed Models with restricted maximum likelihood estimation. We used this method because there was non-independence between the participants and their individual responses. The participants filled out the same questionnaire eight times during the experiment which also requires creating eight rows per subject in SPSS.

When testing the hypotheses the participant id-number and the team id-number were set as subject variables. The task type was set as a repeated variable. The dependent variable was social presence (divided into five dimensions). Biofeedback and tasks type were specified as fixed main effects. Intercept was specified as a random effect with team id-number specified as the subject grouping variable and a variance component (VC) covariance matrix structure. The covariance structure between the repeated variables was compound symmetry (CS).

## FINDINGS

According to the first hypothesis, when biofeedback is presented to the team the feeling of social presence is stronger compared to the situation where biofeedback is absent. The impact of biofeedback to social presence was statistically significant in only one of the five social presence dimensions: 1) Co-presence ( $p < .05$ ).

Social presence in co-presence dimension was reported lower (42.7) in a situation where biofeedback was on in comparison to situation where it was off (43.9). When biofeedback was presented to the team social presence was reported less strong compared to the situation where it was absent which refutes the first hypothesis.

According to the second hypothesis the team members' feeling of social presence is stronger during creative tasks compared to routine tasks. The impact of task type to social presence was statistically significant in three of the social presence dimensions: 2) attentional engagement ( $p < .001$ ), 3) emotional contagion ( $p < .001$ ), and 5) behavioral interdependence ( $p < .05$ ).

In attentional engagement dimension the feeling of social presence was reported higher in creative tasks (30.8) in comparison to routine tasks (29.3). Also in emotional contagion dimension social presence was higher in creative tasks (35.9) compared to routine tasks (33.8). Similarly, in behavioral interdependence dimension creative tasks received higher evaluation of the feeling of social presence (29.6) than routine tasks (28.5). These findings support the second hypothesis.

## CONCLUSIONS

We speculate few reasons why our first hypothesis was not supported. Sallnäs and colleagues (2000) concluded in their study that one reason for the haptic feedback not influencing social presence in a way they had hoped was due to enabling audio discussion between participants. The audio connection may have overshadowed the impact of the feedback available in the virtual environment. In our experiment the audio discussion was also enabled between participants.

After the experiments we also realized that the visualization of biofeedback was inaccurate and thus its interpretation was hard to the participants. Especially the visualization of the skin conductance was misleading. An up and down arrow may easily be interpreted in a way that the participant emotional state or arousal is changing between high and low. However this was not the case since the arrow only indicated change, but not the direction of it.

The focus of interest in this study was not how the participants' interpreted the visual biofeedback but if only the existence of the biofeedback had an effect to social presence. It is however natural that people try to make interpretations of the behavior of others and of the all information that is available in social situations. When interviewed after the experiment, the participants wondered the need for biofeedback since false interpretations can be made so easily. Since biofeedback presents also purely physiological changes in participant's state it is challenging to recognize which changes are related specifically to the feeling of social presence.

The existence of biofeedback was also new and unfamiliar to the participants. People are not used to seeing information of their own or others physiology since these have never been a part of social interaction. Seeing biofeedback has likely confused participants. Because seeing this information was new to participants, it is also natural that the interest was more on the person's own physiology. Due to its unfamiliarity there may not have been an automatic

tendency to associate physiological information to social information or more accurately, social presence.

We found support to our second hypothesis assuming stronger social presence during creative tasks compared to routine tasks. We speculate that the nature of communication is relevant for the feeling of social presence. However, it has to be taken account that the differences between means in routine and creative tasks were small.

Our results give support to for example Tu's (2002) observation of the task types which states that tasks that are creative in nature enhance stronger social presence in comparison to for example conflict resolution tasks. In his study the participants had more vivid conversation and more social interaction during creative tasks. Also in our study it mattered for the feeling of social presence what the team was doing. The participants reported that the creative tasks required more interaction and created more of a collaborative atmosphere in comparison to routine tasks. The participants reported that they felt almost like working alone among routine tasks since these tasks required only a little interaction with others.

## DISCUSSION

Social presence requires feeling psychological and emotional connection to others in addition to perceiving their co-presence with self (Biocca et al., 2003). Despite of its challenges this study acts without a doubt as a spark for studying the connection between visual biofeedback and social presence in virtual interaction. However, the impact of biofeedback to social presence is more complex than the previous research literature suggests.

According to the participants implementing biofeedback to the virtual environment provided an interesting addition to computer-mediated social interaction. However, since seeing visual physiological information during interaction is novel we call for creating more sensitive experimental settings in the future. Using psychophysiology to strengthen the feeling of social presence requires not only unambiguous visualizations but also the use of precise methods and equipment. Heart rate and skin conductance act as indicators of both physiological and psychological changes. For example facial electromyography has been noted to produce more exact information from different emotional states (Ravaja, 2009).

Future research should also take into account the variety and width of social presence as a phenomenon. Social presence includes many perception-, time-, experience-, and communication medium related aspects (Biocca et al., 2003). It is always necessary to accurately clarify what one means when talking about

social presence in virtual interaction. A thorough picture and understanding of this phenomenon can only be achieved through various studies and views.

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# MetaGroups: a method for collective innovation at large conferences

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## ABSTRACT

*This work presents a workshop concept called “MetaGroups” where an audience is divided to smaller groups to enable direct face-to-face group interaction and dynamics, but then these face-to-face groups are bundled linked to other groups with same topic using a computer-mediated communication system, enabling the participants to share views and review others views. This kind of workshop method has three main advantages in comparison to traditional workshops: (1.) MetaGroups can scale up to several hundreds or even thousands of participants in a managed and relatively cost effective way, (2.) large participant count enables more impressive and engaging experience, and (3.) large participant count enable use of statistical peer review and feedback mechanisms for live commenting and reviewing the workshop results.*

## KEYWORDS

*CSCW, co-located commuting, group work*

## PROBLEM STATEMENT AND THEORETHICAL BACKGROUND

During professional events with more than 100 people it is hard to engage the audience in collaborative action and discussion. Usually the practical way is to divide people in different size groups, but often groups with more than 10 people are chaotic and cannot maintain collectiveness between all group members (Plowman, 1994). Hence, for 100 persons conference a workshops session practical means ten or more groups. Disseminating results of more than 10 groups is hard and time consuming, and then again, scaling up groups just make individual groups harder to manage and more uneven, or then scaling up the group number then makes the dissemination and collecting data more complex. Sometimes it is possible to organize workshop as a pair work, but in such a cases the work tasks and coordination is limited. Hence, there is a general need for a group working

solution that can create a good balance between face-to-face interaction and free form discussion - and therefore small size (4-10) – full audience dissemination and control over whole participation.

## METAGROUPS METHOD

MetaGroups method is based on four core design principles:

- Single face-to-face group size is preferably maximum 10 persons (e.g. Littlepage & Silibiger, 1994)
- Single groups are bundled together as meta groups (MGs), consisting of 3-10 face-to-face groups
- Within a MG assignments are worked simultaneously and transparently and orchestrated by group secretary and master of workshop
- In one workshop there can be several MGs working around different topics like in traditional workshop there can be several groups

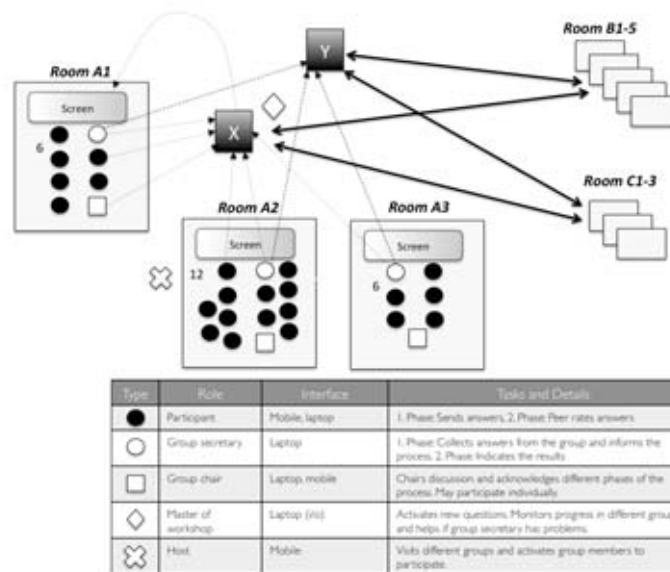
The MetaGroup methodology is related to our earlier work, where we focused on how the idea generation proceeds between different phases (see Liikanen et al, 2011). Single group is a traditional face-to-face meeting group, which can support relatively informal discussion and sharing. Single group is meeting in a comfortable and relatively isolated or in general non-disruptive physical space. Each group has group secretary and group chair. Between groups there is master of workshop activating different workshop episodes and a host that cater different needs between groups. The Figure 1 illustrates the components of the MetaGroups method and interaction between different components.

Participants are active in the MetaGroups format in three different ways: (1.) they are engaged in face-to-face discussion, (2.) they send answers to the questions posed by master of the workshop and group secretary, and (3.) they peer-review others answers by giving a vote for a answer. Within one MG there should be minimum three face-to-face groups, since we do not want to create group vs. group situation within a MetaGroup's session.

It is important to highlight of combining the physical and virtual spaces as done in this work. The previous work on focus groups highlight that there is no major difference in the quality of ideas or the amount of communication in physical or virtual focus groups (e.g. Underhill & Olmsted, 2003), but as mediated environments often lack social cues, this might not be as suitable

for these events. Future work could investigate applying the MetaGroups methods described here to fully mediated environment.

Group secretary and group chair work in pairs. Group chair is responsible about maintaining face-to-face discussion and formulating groups aggregate opinion. Group secretary is responsible in coordinating the action, communicating between master of workshop, and announcing new questions for the group. Master of workshop is moderating the overall progress of the workshop and announcing when new episode in the workshop is beginning. Host has no technical role in the workshop, but cater general needs such as refreshments or access problems, or generic organizational questions.



**Figure 1: Example structure of MetaGroups participation layout**

Technical setup of the MetaGroups is based on four core components:

- Each participant, host and group secretary can participate in the shared collaboration environment through their own web-based device
- Each room has a big screen visualizing the status in that particular meta group (MG)
- Group interaction is hosted in a live participation platform that allows real-time activation of different interaction episodes

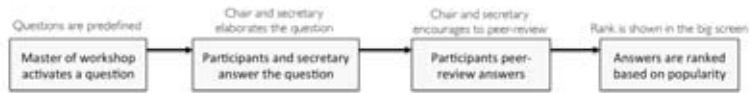


- Between group secretary and master of workshop there is shared chat environment that allows synchronization of action and master of workshop to know the status within each group

The live participation platform used in the MetaGroups workshop is called Presemo (see Kuikkaniemi et al. forthcoming). Presemo is based on real-time web technologies and allows live creation and activation of new participation episodes. Episodes are created from the control view based on pre-defined participation templates. There can be several episodes based on the same participation template, such as anonymous chat. Presemo has three views: control view, participation view and big screen view. In MetaGroups workshop master of workshop operates control view, and four different participation templates were used:

- **Anonymous chat**, where the participants were able to write responses
  - *As a group, list top 5 proposals that will make Co-location Centres vibrant places engaging people to drive ICT innovations?*
- **Rateable chat**, where the participants were able to write responses and “to like” the responses
  - *Which services should a great co-location centre offer to its residents and visitors?*
- **Single-option poll**, where participants were given a list of options, from which the participants choosed maximum of one
  - *How did you like the workshop results?*
- **Questionnaire**, where multiple questions are connected, and answers are not visible to others

Rateable chat answer template is the primary form for the episodes in the MetaGroups. In rateable chat answer participants can propose answers to a predefined question, and then peer-review the answers by providing thumbs up for other answers. The answers are then rated based on their popularity. Figure 2 illustrates the main participation action within the MetaGroups workshop.



**Figure 2 Abstract overview structure of the main participation episode in MetaGroups workshop**

In the practical implementation of the MetaGroups there can be several episodes looped. There can be also different kind of variation of the theme depending on the questions. For example the peer-review can have explicit review scale or several scales. In the next chapter we will elaborate in more detail how the MetaGroups workshop was implemented in an experiment.

## METAGROUPS EXPERIMENT

MetaGroups experiment was conducted within an international professional conference with 145 participants from different European countries. The conference was two-day event focused on planning collaborative action and sharing information regarding the organization. MetaGroups workshop was organized during the afternoon of the first day of the conference. The workshop duration was 1.5 hours. The workshop was divided in to three MetaGroups, which had 3, 6 and 3 face-to-face groups. Face-to-face groups had 4-15 participants. The groups were divided based on participants' own preferences during the earlier sessions in the conference program. Unfortunately not all participants provided their preferences and for this reason two groups had larger than 10 participant count, which was not according the initial plan. Table 1 explains the overview of the MetaGroups workshops schedule.

<b>PRIOR THE WORKSHOP (seminar hall)</b>			
Episode	Time	Description	Roles
Introduction	13:00	No participation	-
Warm-up	13:10	Introduction to the Presemo system and simple poll by host and master of workshop	Host, master of workshop
Keynotes	13:20	Participants posts questions and comments through the system, host pick questions for speaker	All, host,
Groups formation	14:10	Questionnaire asking group preference, role in the group, and expectations.	Participants
Keynotes	14:20	Q&A through Presemo	All, host, presenter
Briefing	15:20	Run-through of workshop methodology and group divisions	Host, master of workshop
Break	15:30	Regrouping to new spaces	Secretaries guide
<b>CORE WORKSHOP (15 different meeting spaces)</b>			
Episode	Time	Description	Roles
Q+A1	16:00	Share good examples regarding the	All + secretary

		innovation process, free rating scale	
Q+A2	16:15	Share good examples of best practice within organization, free rating scale	All + secretary
Q+A3	16:25	New organizational unit ideas	All + secretary
Q+A4	16:35	New service ideas	All + secretary
Q5	16:45	Within f2f group propose 5 actions for the future	Only chair fills
A5.1	17:00	Choose 3 from Q5 answers based on impact	All participants
A5.2	17:00	Choose 3 from Q5 answers based on easiness to implement	All participants
<b>POST WORKSHOP (seminar hall)</b>			
Episode	Time	Description	Roles
Break	17:15	Regroup to main seminar hall	
Wrap-up	17:45	Q5 results (summary) of each MetaGroup presented according the A5.1 and A5.2 rating Comments and rating of results	Host, master of workshop, all
Closing	18:10	No participation	

**Table 1: MetaGroups study session timetable**

As shows in the Table 1, the prior and post action outside the workshop are significant for the orchestration of the workshop. In addition to the group formation exercise there are three other actions before the core workshop that have significance for the workshop arrangement:

1. Warm-up episode in the beginning of the session for introducing the Presemo system for the participants and providing easy and engaging start for live participation during the event
2. Comments and questions participation during the keynotes for making participants accustomed to use the participation system for case specific and relevant commenting
3. Workshop methodology briefing before going in to the specific meeting rooms.

Post workshop the results are presented together for all participants. This is done by summarizing the results of the last question based on the two axis used in the review. Considering that there are 12 face-to-face groups, giving voice to each group (for example 4-5 minutes) would have taken at least one hour run through without any consolidation of the results or any possibility for discussion. In the MetaGroups approach the results were aggregate from each MG semi-automatically, five minutes were used to present each result and there was time for discussion and commenting of these results.

Organizing the MetaGroups workshop can be divided in to three sections:

(1.) preparation, (2.) workshop day, (3.) post workshop impact and actions.

The preparation of the workshop where initiated 2 months before the actual

workshop. There were two other events were parts of the workshops procedure were trialled before hand. The preparation was iterative and involved stakeholders of the event (mostly those who acted later on as group secretaries and chairs) – hence organization was principally co-design event.

The script of the participation was designed so that the questions 1 to 4 prepared groups for the final bigger question. The primary goal of the workshop was to deliver concrete actionable proposals with review from other partners. Other primary motivations for organizing this workshop were: fast execution (maximum 1.5 hours of time for workshop and roughly 1 hour of time for results), simplicity (cannot expect that participants prepare by training use of advanced or complicated or downloading separate programs), and immediate documentation of results.

Questions were initially proposed by an event organizer and then re-formulated and validated by a committee whose members acted mostly as group chairs. There were co-design meetings with chairs and secretaries organized through teleconferencing system and day prior to the conference there was a rehearsal session where chairs and secretaries could run through the script and do final iteration to the assignments.

Post workshop the results were disseminated among the organizers and collected as a one single deliverable, which was then used while formulating the processes and updated business plan.

## OBSERVATIONS AND RESULTS

MetaGroups workshop is evaluated from three different perspectives:

- Organizing practice
- User participation
- User experience during the work shop
- Outcome of the workshop

Organizing practice for such collective and multicultural workshop is always challenging and requires significant amount of communication. Organizers were involved actively in formulating the final script and the content. We believe that the 3 meetings and rehearsal was adequate amount of preparatory meetings before workshop, but preferable there could have been even more communication. During the event the coordination via separate coordination chat channel was necessity. Coordination was mainly focused on assignment scheduling. Even tough

the script defined the questions exactly, different groups had significantly different progress rate depending the group size and chairman's way of managing discussion. Posting questions too early would have created a conflict between visibility of others answering before contemplation within the group. Posting question too late would have delayed the workshop.

Need for separate communication was realized only later during the preparation, and there was no defined procedure for how to use that. In practice the messaging in the coordination chat was composed of: status messages send by group secretaries, help request by group secretaries, estimation request by group secretaries, status request by master of workshop, preparatory announcements and schedule changes by master of workshop, and reminder of different practices by master of workshop.

Overall, in coordination chat there where 0-5 messages per minute, with the average of 1.4 messages per minute during the sample period counting around coordination 200 messages overall. In coordination chat secretaries and host used names, but in addition group secretaries also indicated the group often when they described the status. There was significant difference between group secretaries on who joined the coordination chat. Some of the group secretaries did not attend the coordination at all, but supported only on live participation platform new episode introductions and preliminary guideline. Some group secretaries only watched the discussion in the coordination chat and some attended discussion actively.

Master of workshop estimated the new episode introduction based on how many answers the question had received. On average an episode was expected to receive at least 10 answers before it could be considered saturated. Because of this, the different MGs had different schedule. Estimating schedule based on contribution was considered adequate practice, but overall master of workshop would have hoped that the arrangement would have kept the timing more precise.

Some of the groups followed the timing precisely and prepared for the next question, whereas some of the groups progressed on their own schedule often running behind the master schedule. We estimate that delays in the schedule were mostly due to the group size and group chair coordination practices.

Different groups have varying amount of participants and sub groups. MG1 (meta group 1) had 3 face-to-face groups and (18+6) 24 participants, MG2

had 6 face-to-face groups (28+12) 40 participants and MG3 had 3 face-to-face groups and (18+6) 24 participants. The participant count is not exact in the groups since all participants did not register to the groups through the system. We received sign-up for 120 authentication and 181 overall sign-ups to the system, hence there were 61 anonymous authentication, which most are duplicate devices and some or users who did not authenticate with name (system supported complete anonymity but process recommended use of names). According the registration there were 145 people in the event. Hence, the system use penetration was over 90% during the conference, and most of them also used the system during MetaGroups phase.

Following table shows how much there were participation in each group; how many answer messages (A), peer reviews (P) and what was the top peer review score (H).

Question	MG 1 (A)	MG 2 (A)	MG 3 (A)	MG 1 (P)/(H)	MG 2 (P)/(H)	MG 3 (P)/(H)
1	10	23	12	35/5	67/9	21/4
2	14	33	8	25/8	65/5	30/8
3	10	26	18	53/4	54/6	22/6
4	9	34	9	19/7	75/7	22/5
5	10	34	21			
6a.				-/8	-/9	-/7
6b.				-/12	-/9	-/12

**Table 2: Participation statistics divided in to groups and answers and peer reviews (per question peer review score for 6a and 6b is unavailable)**

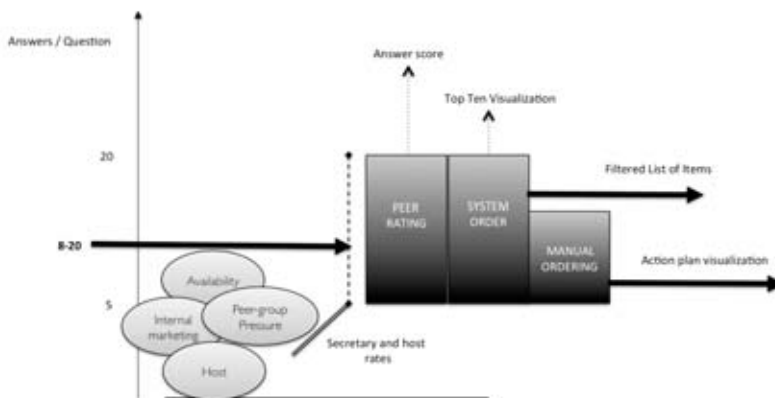
This table shows that there was relatively small variation within MG between participation depending on the question especially in groups MG1 and MG2. Also the review scores are relatively stable between questions (except Q3 for MG1), but there was some increase in the reviews for the 6a and 6b, mostly because these questions were highlighted (160 and 193 total in comparison to 120-130 on other questions). On average one participant gave thumbs up to 2.8 answers in each episode. There was range between 1 to 15 votes given.

The workshop feedback was collected also by using the system. 27 participants responded to the feedback questionnaire. The questions were focused overall on the arrangement and there was no specific questions regarding the workshop organization. Several respondents mentioned specifically the use of workshop system and practice and comments were: *“Nicely organized, and this –workshop tool- is a really good thing-- worth thinking how to get more value out of it”*, *“this meeting was really well organised and choreographed”* and *“Excellent organisation and program”*, and some mixed comments: *“Interesting using –workshop tool- unfortunately people then worked on their laptops instead of listening”*.

After the workshop was finished the results were gathered together and a presentation and document deliverable was composed out of the participation. The event organizers and host provided informal positive feedback regarding the use of the workshop procedure. There was no direct negative feedback from participants or hosts.

## FINDINGS

MetaGroups workshop is designed for larger events, with more than 100 participants. In these cases organizing traditional workshops is not feasible option since group sharing and orchestration is too complicated or time consuming. Figure 3 summarizes the participation procedure of the MetaGroups worksho. It outlines the expected participation scale for each episode, how the participation answers are progressed, and what is the outcome and feedback of the process.



**Figure 3 : Motivation factors, participation scale, participation window and process used in MetaGroups setup**

According to our heuristic estimation<sup>1</sup> after the trial experience the participation in MetaGroups is optimal when single episode receives 8-20 messages. In our case the MG2 had more than 20 messages in certain episodes, which was not desirable anymore. Reading 20 comments was time consuming for hosts and participants and visualizing all comments or even most of the comments in big screen was not feasible. Probably partly because of this also the participation in peer review episodes in MG2 were smaller than expected based on the participant count.

Based on this we can conclude that scaling up MetaGroups should be limited to 4 or 5 face-to-face groups average 6-8 participant in each face-to-face group, and or the participation in larger groups should be limited in some other way<sup>2</sup>. Hence one MetaGroup with the shown practice can sustain maximum 40-50 participants overall including secretary and chair. Overall, organizing the MetaGroups was considerable technical and organizational challenge. Based on our experience we cannot expect that groups could have managed fluently the workshop without secretary and chair that had prior training on the methodology. Hence, MetaGroups requires one or two specialist facilitators per session and then one or two pre-trained person in each face-to-face group. This means that the organization of MetaGroups is not cheap or organizationally simple. Hence, the scalability benefits of the MetaGroups are not entirely obvious, but still potential. Use of coordination systems such as coordination chat is recommended. Number of coordination messages sent highlights the importance of coordination communication.

The benefits of the MetaGroup method are not limited to the scalability of the workshop method for larger events. Based on our observation and informal feedback, participants liked the method since the peer-pressure from other teams created engaging environment and feedback for participation. Also, many commented that similar workshop structures could be arranged in partly or completely mediated events, where different face-to-face groups would be satellites connected with digital tools. In this case the MetaGroups method was used for collecting ideas for further action. It was not used to plan holistic overall proposal or make detailed decision over actions, but merely provide insights and opinions for

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<sup>1</sup> Estimate considers five factors: technical, usability, visualization, processing and aesthetical factors. By heuristically evaluating all these factors we can compute the limits that defines what is the desired amount of participation for this particular

<sup>2</sup> Participation can be limited by asking only selected people to comment, or limiting the amount of participation activation. Use of participation limitation may create unexpected other outcomes for the participation quality.



further decision-making process. It is not entirely clear how well the procedure could be adapted also for large-scale decision-making or more detailed planning. This will be one of our future research questions.

## CONCLUSION

MetaGroups is a workshop method that combines physical face-to-face discussion and mediated peer commenting and feedback between groups. We expected that this approach would allow us to scale workshop practice, as this combined the benefits of small groups and small group interactions and still create a common, shared cognition. However, through the field study we observed that organization still require relatively high amount of effort, nevertheless we also argue that MetaGroups can provide other benefits in terms of more engaging experience and edited outcomes. We expect that new collaboration methods that focus on combining physical and cyber-environments, such the MetaGroups approach. We suggest that creation of these cyber-physical collaboration venues will emerge in the future, thanks to the possibilities provided by web technologies and ubiquitous Internet. This said, this experiment highlights the special attention and trained facilitation skills which are still needed in planning the workshop procedure and assignments.

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# Mixing Co-development Methodology to Support Knowledge Co-creation

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## ABSTRACT

*The paper explores the role of co-development methods in supporting collaborative knowledge creation. The research approach was qualitative, and the case data comprising of video recordings was collected from a co-creation workshop utilizing a specific mix of co-development methods. As our theoretical lens we use knowledge creation literature from both organization and learning sciences, to form a comprehensive view on knowledge co-creation. Our findings indicate that the role of methodology in knowledge co-creation is multifaceted. Furthermore, this paper aims at enhancing the understanding on purposeful use of co-development methods, as well as contributing to the theoretical understanding on how knowledge creation may be supported and mediated through diverse tools and methods.*

## KEYWORDS

*Co-development methods, knowledge co-creation, trialogical learning, process simulation, design game, future recall*

## INTRODUCTION

Innovation and creation of new knowledge are increasingly essential in today's business environment (e.g. Baregheh et al., 2009; van der Panne et al., 2003). However, the ability to create new knowledge requires integrating existing knowledge across various fields of competence and expertise (e.g. Nonaka & Takeuchi, 1995; Alves et al., 2007). Many fields of research and practice have recognized the importance of creating new knowledge, and have responded by introducing new methods for supporting the collaborative creation process. These methods, labeled as 'co-development methods' have been utilized in several fields from product development to social services (Sleeswijk Visser et al., 2005; Kokko, 2006),

and also in different ways ranging from user workshops (Sanders, 2001; Brandt, 2006) to facilitated network meetings (Arnkil et al., 2000; Smeds et al., 2006). Even though the specific methods and objectives of knowledge co-creation vary, the core idea is the same: bringing together people with diverse knowledge in order to collaboratively create new solutions and ideas - new knowledge. In this study we explore how specific co-development methods are used to support the collaborative knowledge creation process.

The co-development methods aimed at supporting knowledge creation have mostly been studied and developed in their specific contexts of use, and thus not enough is known on how they are purposefully applied and utilized in different contexts and configurations. Even though the methods' core objectives are rather similar (i.e. to advance collaborative knowledge creation), each method supports knowledge co-creation in a different way. Therefore, combining and applying the methods in tailored configurations in different cases could offer potential value for knowledge co-creation.

In this paper we study how mixed co-development methodology supports knowledge co-creation. More specifically, we answer the research question: *What kind of roles do the co-development methods have in collaborative knowledge creation?* We answer this question on the basis of empirical data analysis comprising video recordings of a co-creation workshop where a specific mixed co-development methodology was utilized. First, we present the theoretical background and central concepts of the study, followed by a description of the case study methodology and data. Next, we present the findings of the study, followed by the conclusions.

## THEORETICAL BACKGROUND

In this study we examine the use of co-development methods through the theoretical lens of knowledge co-creation. The topic of knowledge creation has been studied in diverse contexts, and the results have generated a pervasive consensus that knowledge creation is embedded in social interaction and dialogue (e.g. Tsoukas, 2009). This socio-cultural perspective emphasizes learning and knowledge creation to occur through participation in communities in which existing knowledge is shared and transformed among the participants (Sfard, 1998). Thus, knowledge creation is seen to take place when crossing boundaries of knowledge (Carlile, 2004), expertise (Nonaka & Takeuchi, 1995), and practice (Lave & Wenger, 1991).

Tsoukas (2009) argues that knowledge is created in 'conversational interactions' (dialogue), but, in our view, not enough is known about the

methods structuring this interaction. Furthermore, adding on to this dialogical approach of knowledge creation, we see knowledge co-creation as a trialogical process (Paavola & Hakkarainen, 2005). In trialogical interaction knowledge is created in collaboration within a group with the help of shared objects, by collaboratively developing them further. Thus knowledge co-creation is mediated by the objects or artifacts (Paavola & Hakkarainen, 2005), and knowledge creation has a material basis through the mediating objects (Hakkarainen, 2009).

According to Hakkarainen (2009) the collaborative creation of new knowledge takes place through collective epistemic practices “that guide and channel the participants’ intellectual efforts in creative and expansive ways”. This process is characterized by both deliberate advancement of the existing practices and systematic pursuit of new knowledge exceeding the current expertise. The group’s epistemic agency emerges through participation in the shared activities, i.e. intentionally pursuing its epistemic goals. (Paavola & Hakkarainen, 2005) To sum up, this approach studies knowledge creation as an intentional process through which joint practices (Engeström, 1999), shared objects of activity (Paavola & Hakkarainen, 2005), or material or conceptual artifacts (Bereiter, 2002) are developed collaboratively.

Our study examines a combination of three co-development methods, namely SimLab™ process simulation, future recall, and design game. They all aim at supporting collaborative knowledge creation between interdisciplinary, inter-professional, or otherwise diverse participants.

**SimLab™ process simulation** is a method for collaborative business process development, and aims sharing and creating knowledge among the actors of a networked process. In practice, the method upholds a facilitated discussion, supported with a visualized process model that acts as a boundary object and outlines the discussion. (Smeds et al., 2006)

**Future recall** is a method used in social services for emphasizing multidisciplinary collaboration and empowerment of the customer. (Seikkula & Arnkil, 2005) In practice, future recall is about creating shared solutions by following a specific type of discussion pattern conducted by facilitators. The method focuses on positivity and solution creation, as well as ensuring that every participant is equally listened. (Kokko, 2006)

**Design game** is a conceptual and practical framework used in co-design, i.e. for engaging users and other stakeholders in the design process (Sanders, 2001; Vaajakallio, 2012). Design game framework is a tool for discovering and articulating tacit knowledge and latent needs of the users

by exploiting game-like elements, such as tangible game props, rules of activity and imaginative approach (Brandt, 2006; Vaajakallio, 2012).

This study analyses a specific mixed methodology (later ‘mixed method’) utilizing elements from the three co-development methods described above in a co-creation workshop. This combination is especially interesting since the practical characteristics of the individual methods vary significantly from each other. In addition, the methods have diverse theoretical origins from different fields of research and practice.

With regard to the co-development methods, knowledge co-creation theories address three especially interesting aspects. Firstly, new knowledge is created by integrating a variety of existing knowledge, such as previous experiences and individual understanding (Nonaka & Takeuchi, 1995; Lave & Wenger, 1991; Paavola et al., 2004). All the three methods studied in this paper fulfill this criterion as they aim at gathering network stakeholders (Smeds et al., 2006), families and social service networks (Arnkil et al., 2000), or designers and users (Sanders, 2001) in joint development. The core idea in all the three methods is to share and integrate knowledge, varying from experiences and practices (Smeds et al., 2006) to latent needs and dreams (Sleeswijk Visser et al., 2005; Arnkil et al., 2000).

Secondly, knowledge creation is understood to be embedded in social processes of interaction, such as participation (Lave & Wenger, 1991), knowledge transformation (Carlile, 2004), as well as development of joint practices (Engeström, 1999). Thus, the role of collaboration is essential in knowledge co-creation, and needs to be supported with co-development methods. Compatibly, all the three methods studied here aim at organizing and facilitating collaboration, by means of for example discussion rules (Arnkil et al., 2000; Brandt et al., 2008) and facilitators (Smeds et al., 2006; Kokko, 2006), which all can be seen as epistemic practices supporting the knowledge co-creation process (Hakkarainen, 2009).

Thirdly, knowledge co-creation is mediated by tangible and conceptual artifacts in two ways: by facilitating knowledge transformation (Carlile, 2002), and by mediating the collaborative creation process (Paavola et al., 2004; Bereiter, 2002). Accordingly, the co-development methods studied here exploit the effectiveness of artifacts, varying from game props (Brandt, 2006) to visualized process models (Smeds et al., 2006), or jointly described narratives of the future (Seikkula & Arnkil, 2005).

To sum up, knowledge co-creation theories suggest that both fluent collaboration and a creation process are essential in knowledge creation. The literature already proposes some tools that methods may offer, such as

boundary objects (Smeds et al., 2006), discussion facilitation (Kokko, 2006), and rules for collaboration (Brandt et al., 2008). Our empirical study aims at broadening this understanding by discovering the variety of roles that the mixed method had in the case workshop.

## THE CASE STUDY METHODOLOGY AND DATA

The empirical data was collected from a co-creation workshop that utilized, as we call, ‘mixed method’, i.e. combined elements of three different methods, in the context of intra-firm process development. The case firm is a multinational organization operating globally in the field of industrial machinery and equipment. The firm’s purpose for participating in this action research was to develop its internal global collaboration practices related to front-end of innovation. The objective of the case workshop was to create a mutual understanding about desired innovation practices within the organization, and a concrete plan in implementing them in the future.

The mixed method used in the case workshop combined elements of SimLab™ process simulation, future recall, and design games. The workshop participants (n=11) consisted of the firm’s R&D management and employees, including one representative from the ICT tool provider company. The organizers and facilitators were researchers and research assistants (n=6). A representative from the firm’s management was also involved and consulted when planning the workshop in order to refine researchers’ plans according to the firm’s expectations.

The one-day workshop consisted of four parts. In brief, current challenges were first discussed in order to create shared understanding of the starting point, and the rest of the workshop was structured according to the idea of future recall. First the participants were transferred to the future (5 years), followed by a card game in which they recalled and created solution ideas in groups. Thereafter the participants gathered in a joint exercise to create an implementation schedule for the ideas in the form of a timeline.

Before the workshop, the researchers identified eight challenges regarding the innovation process. These were used to support and structure the discussion throughout the day. At the beginning of the workshop, the identified challenges were discussed carefully with the participants, resulting in a shared understanding on the challenges and the current problems related to them. The eight challenges were later used as the basis for the game board.

The time frame of the future recall was set to five years (2011 to 2016). It was considered to be short enough to create feasible solutions but long

enough to produce open-minded and novel ideas. The transfer into the future was actualized with a fictive future story written by the researchers, including a description of the innovation practices in the pilot company in 2016, addressing the company to be one of world's best in innovation.

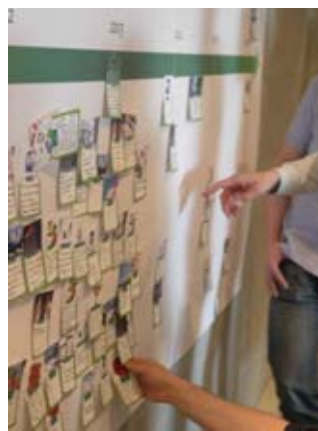
The future recall continued in an idea card game that was played in three groups of 3-4 participants and one facilitator. The objective of the game was to ideate the solutions that until 2016 were executed to support successful and collaborative innovation within the pilot company. Each group was given a game board that represented the eight challenges discussed in the morning and a deck of 52 idea cards. Each card had a brief inspirational text and picture to support and direct ideation. The participants were



**Figure 1. Idea card game.**

instructed to ideate the solutions by recalling from year 2016, and to write the specifics of the idea and its implementation on an idea card. Then they explained their idea in their groups and placed the card on the game board next to the challenge that the idea solved the best (Figure 1).

After the idea card game, the three groups gathered in a joint exercise in which the ideated solutions were collected together. The purpose was to create a concrete implementation plan for the solutions on an empty timeline (years 2011-2016) on the wall. The participants were asked to take idea cards from their group's game board and briefly explain the implementation to everyone. Then the idea card was placed in the timeline, in the specific time of implementation (Figure 2). The facilitators encouraged discussion about the ideas and the reasons they were set in specific points of time.



**Figure 2. Timeline exercise.**

The whole workshop was video-recorded to collect the case data. The workshop interactions captured on the video recordings were analyzed with qualitative methods (interaction analysis) with the help of ELAN software. The focus of the analysis was on how methodology was present in interactions, i.e. how artifacts were used and developed, how the dialogue was structured, and how facilitation took place in the dialogue. The

empirical analysis focused on the interactions observable in the data, and thus leaves out the individual within-mind processes of ideation, sense-making, and such. The observations were first annotated, then classified, and finally analyzed in more detail.

## FINDINGS OF THE STUDY

Our findings comprise a list of observations about how the mixed methodology appeared in the process of creating the ideas and the road map for future development. We divide the observations into two categories: (1) roles of artifacts, and (2) roles of facilitation. The tangible artifacts, i.e. the game board, the idea cards and the timeline poster, were used in the interactions in following ways:

- The eight challenges on the game board were used as shared language in explaining, reasoning and categorizing the ideas.
- Empty idea cards and the empty timeline poster were used as the objects of the creation process, as they were collaboratively filled and developed further.
- The idea cards were linked to each other and thus used as materials for constructing the big picture (i.e. implementation processes, development systems).
- The idea cards were used as representations of discussion openings, obliging participants for active turn taking.

The facilitators of the workshop did not take active roles in leading the discussions, but instead directed and encouraged the discussion through prescriptive metaphors and instructions. The facilitation and instruction setting was observed to affect the interactions in following ways:

- The game metaphor framed the discussion rules, as there was no criticism on others' ideas (a general characteristic of games is that others do not intervene with one's game moves). Instead, the players expressed further ideas or additional suggestions.
- The game metaphor also affected the discussion structure as turn-taking is a common feature for games.
- Future orientation increased open-mindedness and playfulness, as there are no right answers regarding future activity.
- Facilitators encouraged further discussion and elaborating when needed.



The data analysis indicates that the artifacts and facilitation were much dependent on each other. This implies that the methodological choices affect each other and thus should be examined as a coherent entity instead of separate methodological elements. Based on the empirical findings we suggest the following as potential roles of co-development methodology in knowledge co-creation:

**Rules and mindset for collaboration**, i.e. the settings that are created for interactions. The collaboration rules may be well-defined (Arnkil et al., 2000) or more as guidelines of constructive dialogue (e.g. Brandt, 2006). Collaboration may be given a mindset, such as envisioning future (Kokko, 2006), exploring dreams (Sleeswijk Visser et al., 2005), or directing the discussion towards a visualized process model (e.g. Smeds et al., 2006).

**Facilitators' roles**, i.e. the facilitators' knowledge and interest to the case. They may be entirely external (Seikkula & Arnkil, 2005; Lundberg & Arvola, 2007), external facilitators but familiar with the case (Smeds & Alvesalo, 2003), or organizers that also participate in the workshop (Brandt et al., 2008). The roles are defined according to the sensitivity (Seikkula & Arnkil, 2005) and objectives (Brandt et al., 2008) of the workshop.

**Discussion facilitation**. The facilitators may have comprehensive control on the discussion (Arnkil et al., 2000) or they may encourage desired activities when needed, such as use of artifacts (Smeds et al., 2006; Lundberg & Arvola, 2007), coequal collaboration (Arnkil et al., 2000; Smeds et al., 2006), or decision-making (Lundberg & Arvola, 2007).

**Assignments and metaphors as discussion structures**. Co-development methods vary in terms of the specificity of the structure they uphold (e.g. Arnkil et al., 2000; Smeds et al., 2006). The structures may be described through facilitation (Arnkil et al., 2000) or metaphors, such as playing a game (Vaajakallio, 2012).

**Mindset as a trigger for ideation or decision-making**, i.e. the perspective for approaching the topic. The mindset may have diverse foci, such as envisioning future (e.g. Arnkil et al., 2000; Sleeswijk Visser et al., 2005), elaborating current situation (e.g. Smeds et al., 2006), or ideating solutions (e.g. Arnkil et al., 2000). The end result and the process to it may be either well predefined (Arnkil et al., 2000) or open (e.g. Brandt, 2006).

**Shared language** that helps the participants in articulating their understanding. The participants' current knowledge may be shared through, e.g., discussion and visualization (e.g. Smeds et al., 2006), but in some cases the current issues may also be omitted (Arnkil, et al. 2000).

**Boundary objects**, i.e. the artifacts that mediate knowledge transfer and transformation (Carlile, 2002; 2004). In co-development, boundary objects take various forms, such as visualizations (Smeds et al., 2006), artifacts (e.g. Vaajakallio, 2012), and discussion notes (Seikkula & Arnkil, 2005).

**Metaphors embedded in artifacts.** For example game props may evoke playfulness (e.g. Vaajakallio, 2012), references to places of events support articulating context knowledge and experiences (e.g. Brandt, 2006), or inspirational artifacts may provoke envisioning (Brandt et al., 2008).

**Tangible objects of development** that mediate the creation process (Paavola & Hakkarainen, 2005). These vary in each co-development methods, but they may be for example drawn, built, written, discussed, or a combination of these (e.g. Smeds et al., 2006; Kokko, 2006; Sleeswijk Visser et al., 2005; Vaajakallio, 2012).

**Artifacts as metaphors for discussion structures**, i.e. the kinds of interactions the artifacts encourage. The artifacts may evoke turn taking, as in the empirical case, or encourage for example negotiation of alternatives (e.g. Vaajakallio, 2012).

Figure 3 represents the discovered roles of co-development methodology in knowledge co-creation. The methodological elements were noticed to support both collaboration and creation in the process of creating new knowledge from the basis of existing knowledge. What is particularly notable is that methodological elements may act in more than one of these roles, and thus support both the collaboration and the creation process.



Figure 3. The roles of methodology in knowledge co-creation.

## CONCLUSIONS AND DISCUSSION

Our core conclusions are related to the variety of the effects that methodology may have. Firstly, both the theoretical and empirical findings support the conclusion that knowledge co-creation takes place in social

interaction of creating new, in which both collaboration and creation simultaneously take place. Secondly, the effects of methodology were found to be multifaceted, and in particular dependent on each other. Thus, methodological elements build a coherent entity of a mixed method, in which they simultaneously affect both collaboration and creation.

As practical contribution, this study offers understanding for tailoring co-development methods in diverse purposes of knowledge co-creation, such as process development, service design and conflict mediation. The list of the discovered roles of methodology may be used for elaborating a mixed method by sorting out the methodological choices and their planned impacts. Furthermore, the clarified roles of the methodological elements may be used as a tool for both researchers and practitioners for perceiving specific co-development methods and tools in detail and for comparing the tendencies and characteristics of a variety of methods.

Our study explores knowledge creation in an organized co-development workshop. In knowledge creation theories, innovative knowledge communities are mostly described as independent, self-organized communities (Paavola & Hakkarainen, 2005). The literature on co-development methods, however, suggests that the facilitators or other organizers select the participants and orchestrates the knowledge creation process for them (e.g. Kokko, 2006; Smeds et al., 2006). Thus co-development interventions conducted by researchers, designers or other external organizers do not comply with the theories of knowledge creating communities as such. Instead, we suggest that co-development methods may be considered as structures for creating temporary versions of innovative knowledge communities that follow a planned development intervention executed with specific tools and methods. Thereby the use of co-development methods provoke, organize and facilitate knowledge creation processes that otherwise are usually unconscious (Nonaka & Takeuchi, 1995; Wenger, 1998), self-triggered (Engeström, 1999; Paavola & Hakkarainen, 2005) and challenging (e.g. Carlile, 2004).

Additionally, our study complements the previous literature on the diverse roles for artifacts in knowledge co-creation. Knowledge creation theories describe artifacts as mediators for knowledge conversions (Nonaka & Takeuchi, 1995), knowledge transformation (Carlile, 2002; 2004), and the creation process (Paavola & Hakkarainen, 2005). The findings of this study support these roles of artifacts, but also raise a new viewpoint. According to the video data analysis, the artifacts had significant role also in triggering the mindset and structuring the discussion, i.e. forming the epistemic practices (Hakkarainen, 2009). This study suggests that in addition to the

mediation of knowledge transformation and creation process, artifacts have a significant role in forming the epistemic practices as they may provoke attitudes, mindsets, and specific types of interactions.

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# The roles of objects in collaborative workshops

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## ABSTRACT

*In this paper, we report the very first findings from the multidisciplinary research project ATLAS that aims to increase our theoretical understanding of collaborative methods in service development. The paper brings together theories of knowledge creation and design research and contributes to the discussion on the role of objects in collaboration. The findings shed light on the contextual factors that give rise to changes in the roles objects play in service co-development workshops. The research approach is qualitative, and case data was collected from three collaborative workshops. Our initial findings indicate that contextual factors, such as, the aim of co-development, the phase of the service development, and the theoretical approach affect the way objects are used in co-development. Furthermore, we argue that the changes in the roles of objects are more complicated than Nicolini et al. (2012) suggested. We conclude that further research should be conducted on the contingencies of object use in collaborative service development.*

## KEYWORDS

*Boundary objects, shared artefacts, collaborative service development, workshops, methods, co-development, co-design, knowledge co-creation*

## INTRODUCTION

The role of objects in collaborative work has been discussed in several disciplines from many perspectives during the last decade. Prior research related to objects in the field of organization science has focused, for example, on boundary objects in inter-organizational product development (Carlile, 2002; 2004), collaboration between design and production (Bechky, 2003), using objects in cross-disciplinary research work (Nicolini et al., 2012), and knowledge work within a professional practice (Ewenstein

& Whyte, 2009). The learning sciences, for their part, have explored the use of shared, or trialogical, objects in knowledge co-creation (Hakkarainen & Paavola, 2009), boundary objects in multiprofessional negotiations (Lallimo et al., 2007), and creating new knowledge with the help of epistemic objects (Miettinen & Virkkunen, 2005). In co-design research, objects have been studied to understand the roles of artefacts in participatory innovation (Sproedt, 2012), in scaffolding everyday people's creativity (Sanders, 2006), and in bringing contextual user insights into the design process (Mattelmäki, 2006; Sleeswijk Visser et al., 2005).

A recent review by Nicolini, Mengis and Swan (2012) integrates findings from research informed by activity theory, theory on boundary objects, epistemic objects and material infrastructures. They argue that the role of objects changes during the collaboration process. Different kinds of objects are more useful in different phases of a project and the role of a particular object may change during a project, i.e., it can be used in different ways depending on the practices where the object is used. Further, Nicolini et al. (2012) stated that research should be directed at the reasons and conditions under which these changes take place.

Our study aims at filling in this gap by shedding light on contextual factors that give rise to these kinds of changes in collaborative development projects. More specifically, in this paper we focus on the context of service co-development and service design and analyze empirical data from workshops where collaborative sharing and development take place. We describe how different kinds of objects are used, and analyze what kind of roles they take in these endeavors.

The purpose of this paper is twofold. Firstly, it aims to contribute to the practical understanding of the relationships of contextual requirements and objects used in the workshops. For this, three workshops aiming at knowledge co-creation in different practical and theoretical contexts are used as the empirical setting. Secondly, the paper aims to open the arena for the theoretical discussion on design artefacts, boundary objects, and trialogical learning. To reach this goal, this paper brings together theories and concepts from organization studies, learning sciences and design studies in order to form a more holistic understanding of the phenomenon at hand. We aim to discuss the distinctive and changing roles of the objects as well as the concepts that are used to describe them. Based on our empirical research, we answer the research question: 'How are contextual factors reflected in the objects and their use in various service co-development workshops?'

## THEORETICAL BACKGROUND AND LITERATURE

Although there is plenty of research on using objects in collaborative workshops, they look at the phenomenon from distinctive theoretical perspectives and fail to address it holistically. In this paper we bring together two research perspectives, namely knowledge co-creation (from both organization and learning sciences) and co-design (from design studies). The theories of knowledge creation in learning science stem from the socio-cultural view on learning (e.g. Säljö, 2001), where learning and knowledge construction are seen as social processes embedded in social practices and communities and in which the use of various objects plays a central role. The theory of knowledge creation relevant in organization studies originates from the practice-based view on organizations that understands knowledge as social and situated practices and materialized into objects that can help cross the knowledge boundaries (e.g. Brown & Duguid, 1998; 2001). The theory on objects in co-design springs from the sociology of participation, the philosophical tradition of pragmatism, as well as the phenomenological ideas on embodiment. The theoretical common ground of knowledge co-creation and co-design is found in pragmatism and in the views that objects function as mediators of action and that new knowledge is created through practical engagement with objects.

### **Objects in knowledge co-creation**

The role of objects in knowledge co-creation has been studied from two complementary perspectives. Organization science has focused on the use of boundary objects and the concept of boundary spanning or crossing between communities and organizations, whereas the learning sciences have focused on the micro-level of knowledge creation, the social interaction between individuals creating knowledge with the help of various objects.

Boundary object is defined as an object that is used as vehicle of knowledge and aggregator of knowledge co-creation in collaborative encounters. According to Star and Griesemeyer (1989) boundary objects are characterized by a double-ability: first, they are malleable when used inside one social domain, and second, they are also robust enough to work across different social worlds. Boundary objects, as externalizations of knowledge, enable transferring, translating, and transforming knowledge between people over different knowledge boundaries (Carlile, 2004). In addition, boundary objects can trigger the participants to form a shared understanding through the interaction emerging around the object (Fischer



& Ostwald, 2003). Furthermore, Fenton (2007) argues that visualized boundary objects help to envision and concretize the future, and to understand the upcoming changes. Boundary objects can be divided into two categories: first, the designated boundary objects that are formally nominated to facilitate boundary-spanning collaboration, and second, the boundary objects-in-use that with or without nomination are taken in use in the collaboration due to their practical relevance (Levina & Vaast, 2005).

Furthermore, visual representations serving as epistemic objects may act as ‘artefacts of knowing’, and can be used for developing knowledge collaboratively (Ewenstein & Whyte, 2009). Epistemic objects are ‘rather open-ended projections oriented to something that does not yet exist, or to what we do not yet know for sure’. Thus due to their future-orientation and flexibility, epistemic objects are seen as generators of new ideas and knowledge. (Knorr Cetina, 2001; Miettinen & Virkkunen, 2005)

The social-interaction level of knowledge creation and the role of objects in it has recently been conceptualized by learning scientists as a trialogical process of learning. In the trialogical process, new knowledge is collectively and intentionally created within a community through developing shared objects. These shared, or trialogical objects play a double role: they are collaboratively created and elaborated, and at the same time they mediate the interaction. In trialogical learning there are always three elements in a ‘trialog’: the individual, the community, and the mediating objects. The collaborative creation of new knowledge takes place in the community through collective epistemic practices ‘that guide and channel the participants’ intellectual efforts in creative and expansive ways’. The shared objects (e.g. existing practices, concepts, tangible objects) are deliberately developed, and new knowledge is systematically pursued. (Hakkarainen et al., 2004; Hakkarainen & Paavola, 2009; Hakkarainen et al., 2011)

### **Artefacts in design**

The study of objects is at the core of co-design and the role of objects has been researched extensively. Various kinds of representations are used throughout the design process. In line with Nicolini et al. (2012), their functions and qualities differ depending on the phase and the needs of the project. In early concept design, objects are typically ambiguous and open-ended to evoke interpretations and insights from users’ experiences and contexts. For instance, generative tools that may vary from visual collages to three-dimensional artifacts aim to allow ordinary people to express their experiences and dreams through making tangible representations. Hence

these outcomes work as scaffolds for experiences and bring inspiration and insights for the design team. (Sleeswijk Visser et al., 2005)

In design it is acknowledged that simple representations open up a solution space, whereas more detailed models narrow it down (e.g. Brandt & Grunnet 2000). When Iacucci and Kuutti (2002) conducted the ‘on the move with the magic thing’ experiments, they used a simple mock-up, a magic thing, to support users’ thinking and acting. The magic thing is open in nature, and it can do anything the user can imagine. The unfinished nature makes it easier to distinguish the artifact from real objects and to perceive it as a tool for ideation, instead of as a representation of the final design (Ehn & Kyng, 1991). On the other hand, in the study presented by Halse (2008), the mock-up had already a certain form and features based on the earlier phases of the design process. The more finished objects in co-design focus the discussion and support making decisions concerning the future (e.g. Salmi et al. 2012).

In collaborative design projects, supporting dialogue and building common language is considered important (e.g. Brandt, 2006). Objects are utilized to support negotiation among distinct perspectives in a setting providing ‘safe circumstances’ for conflicts (e.g. Buur & Larsen 2010; Agger Eriksen & Vaajakallio, 2013). Co-constructing a wider perspective into a topic under scrutiny is supported e.g. by design games (Ehn & Sjögren, 1991; Brandt, 2006; Vaajakallio, 2012). In design games objects are typically playing cards, game boards, game rules, or game characters. As applied by Vaajakallio (2012) the main goal is then to trigger players’ memories and feelings, to allow explicating them through the game, and to gain different views in an empathic way.

When the purpose of a workshop is to use gained user insights or contextual information as ground for new ideas, specifically designed objects introduce the knowledge in the form of photos, video clips, personas (e.g. Buur & Søndergaard, 2000; Sleeswijk Visser et al., 2005; Vaajakallio et al., 2010). In addition to predesigned materials, objects can be basic materials that refer to readymade material such as a pen and a paper, clay, disposable cups, etc., which are brought, without a specific meaning attached, to a co-design workshop. Materials are also often field/project specific. (Agger Eriksen, 2009) Both the basic and the predesigned materials can be general or field/project specific, or, as Vaajakallio (2012) among others has observed, it can even be a combination of all three: i.e. basic, predesigned and field/project specific.

Artefacts in co-design can be divided into verbal, institutional, and material artefacts (Bødker, 2009). Verbal artefacts include e.g. formal instructions,

quality of questions being asked, and expectations set up through an invitation. Institutional artifacts refer to implicit values and norms embedded in a certain socio-cultural or institutional context, where the co-design happens and where we find the initial motivation and users' previous knowledge on the topic. Material artifacts consist of various tangible props and of the physical context that influences the relationship between activities, users and designers.

## METHODOLOGY AND DATA

This paper focuses on three cases that were part of three service co-development processes. Each case included collaborative workshops with multiple stakeholders organized and facilitated by researchers. Data consists of video, audio and photographic recordings, and written documentation as well as the artefacts used in these workshops. We introduce the cases shortly, after which we discuss how diverse objects were selected, utilized and how they influenced the workshop. To structure the case descriptions, we have used the following themes and dimensions: the roles of the participants and researchers in co-development projects, the general aim of the project, the central aim of the workshop, methodological choices and tools employed.

### **Case 1: Gaining user insights through collaborative storytelling**

'Storytelling Game' is a design game for orchestrating a co-design workshop that aims at gaining user insights and exploring new design opportunities with service end-users, service developers and design researchers. It was created in 'Developing Extreme Service Design Methods' project (2008-2009). The general aim in the project was to create and apply new methods and tools for creative collaboration in user-centred service design. The central aim of the workshop as well as the Storytelling Game was to explore novel service ideas through collaborative storytelling. It was played out three times in 2009, twice for developing bank services and once in exploring new service opportunities related to social media. In this paper, we focus on the latter one.

The phase of the case study can be described as concept search, which precedes the actual concept design and a precise design brief (Koskinen et al., 2003). The empathic design approach directed methodological choices and co-design was utilized to allow a multidisciplinary group of people, including possible users to co-construct representations about the user's world in forms of collectively created scenario.

Approximately 20 participants were divided into three groups including researchers, service designers, service developers and possible service users. In addition to the players each group had two facilitators: a moderator who made notes to the storyline and encouraged storytelling, and a creative secretary who tried to reveal participants' personal stories and attitudes related to the situations, encounters, and incidents, which emerge during the story. Participants represented users with different ages, experiences and skills in regard to social media. The overall question addressed to the participants was: What novel service opportunities within a social media could there be for the partner company?

The groups were asked to create a fictive story guided by a given title, such as 'a good-humored surprise or a savior of the day. These titles could be considered as pre-designed 'objects', which aimed at triggering imagination and allowing unexpected ideas and topics to emerge. Also, the groups were given paper with a drawn timeline, post-it notes, and piles of stickers illustrating a variety of social media. The players thus co-created the story guided by the objects created by the researchers. (see Vaajakallio, 2012).

The resulting ideas were not designed solutions as such but pointed out design possibilities grounded to user insights and contributed to partnering companies' on-going service development projects. The scenario and its creation process made user insights visible for service designers and developers including user experiences, values, and needs embedded in the story.

### **Case 2: Participatory future - oriented 3D concept generation - a method for the ideation of future service concepts**

Participatory future-oriented 3D concept generation was developed within the ideation of next generation health insurance of a Scandinavian financial and insurance company. The goal was to develop ideas for a future-oriented service concept of health insurance which would better correspond to the changing needs of healthcare. This method was part of a larger development project aiming to find, test and implement approaches for customer-involvement within an innovation process model of the company. The opportunities for development were wide at this stage and new ideas were sought with a particularly open scope. Simultaneously, the method allowed comparing views between the company developers and the users. The company could also use the out-of-the-box ideas they found interesting from the user workshop in their internal communication. A ready-to-use concept was not the aim of this exercise. (Holopainen & Helminen, 2011)

We organized two workshops with two participant groups: in one group there were five company representatives (experts) and in the other four insurance users. The groups worked separately and during a different day and so they were not aware of the choices made in the other group. We did not interview the users on their reasons for participating in this workshop. Most of them were students or had recently been students and they could use their time for a half a day session. As a small compensation lunch and movie tickets were also provided.

The first part of the workshop consisted of a trend card discussion. The pack of trend cards with a name and images stimulated the participants into discussing what the future of health care could be like in the year 2025. The participants had to choose the most relevant trends to arouse lively discussion. A blank card was also given in case a trend was perceived to be missing. (Holopainen & Helminen, 2012) The second part was the 3D concept generation which meant building a physical model of the service concept, disassembling, naming each element and grouping them. In the disassembling phase the participant interpreted the meaning of each physical element of the concept and wrote them down in post-it notes. (Helminen et al., 2010) The facilitators did not participate in the discussion or the concept generation, but only gave an introduction and instructions for the sessions.

Building materials played a central role in concept generation. The set of accessories contained for instance modeling clay, stickers, simple wooden human figures, small post- it notes and straws. Additional equipment included a table with a plain surface, chairs, and a whiteboard where one can attach post- it notes. (Helminen et al., 2010)

### **Case 3: Future school – collaboratively creating the future networked educational services**

This case explores a co-creation workshop organized as a part of a larger research project (InnoSchool, 2007-2010, c.f. Smeds, et al., 2010), and the case involved a network of five schools. The case workshop we are looking at was the first one in a series of three, and the general aim of the whole development project was to further develop an existing educational service towards 'regionally coherent comprehensive education'. To reach this goal, the different actors were brought together to generate ideas and envision the future service, and to develop the network's collaboration practices. The central aim of the workshop was 1) to envision the change and to create a shared understanding of it, and 2) to collaboratively create the concrete

action plans towards the desired future. Thus, the studied workshop launched the concrete 2-year co-development process within the network.

The workshop was attended by ca. 50 people, including the schools' teachers and principals, representatives of municipal school administration, and researchers. The workshop day had two parts: in the morning there were common, facilitated discussions around the boundary objects, and in the afternoon the participants were divided into five parallel thematic groups. The backbone of the workshop was formed by the SimLab™ process simulation method, complemented with scenarios and future recall. The SimLab™ method was utilized to form a shared understanding of the object of co-development and to enable the participants to share and create knowledge together. Furthermore, a scenario was used together with the future recall method to promote the emergence of empathy and creativity amongst the participants. The target was 1) to enable the adults to take also the pupils' perspective into account and 2) to break free from the constraints formed by the current practices and to openly ideate the future.

The central boundary objects used in the workshop included a speech-bubble visualization of the envisioned educational service, a visual process model of an imaginary future school week together with a narrative scenario from the perspective of a fictional pupil, and written action plans for implementing the envisioned changes. The action plans were created by the workshop participants during the group work phase, whereas the other boundary objects were prepared by the researchers. The actions plans were also the concrete outcome of the workshop as they were realized during the following months.

## FINDINGS AND DISCUSSION

Based on analyzing the cases, we identified four main contextual factors that affected most the use of objects in co-development workshops: 1) *the general aim or purpose of change* (to create new ideas or to develop something that exists), 2) *the central aim of the workshop* (to elicit participants' views through objects made by them or to use objects pre-designed by facilitators), 3) *the phase in the service development* (temporal dimension of collaboration), and 4) *the approach* (emphasis on the rational or the emotional, and centralized or distributed power) of the project. It should be noted that these factors are partly overlapping and interdependent. Next, we will discuss the three empirical cases with the help of these dimensions.

*General aim and purpose of change* affected most prominently the use of objects in the workshops. In the cases 1 and 3 scenarios were utilized as way of telling a story that combined facts and fictional elements. However, in case 3 it was pre-designed by the researchers, whereas in case 1 it was built from the fragments told by the participants and it was collectively decided which parts went into the final scenario presented to other groups. This difference in using the scenario as an object was caused by the general aim of the workshop: in case 1 the goal was to collect new ideas, whereas case 3 aimed to develop further the existing service.

*The central aim of the workshop* also affected the use of objects significantly. In case 1, pre-designed objects were minimized because the central aim was to gain participants' insights while envisioning future opportunities, not to co-create knowledge based on previously collected user data as in case 3 where the user study had been transformed into variety of objects to underline e.g. pupils' perspective. To move from pure verbal means towards more tangible story, the propositions made by the participants in case 1 were materialized by the moderator, who wrote them down to post-it notes and placed them on the timeline. This way every participant contributed material, 'building blocks', for the common object, instead of reacting to objects provided by researcher. In cases 2 and 3, the objects were both pre-designed by researchers and constructed by the participants; the power shifted from the facilitators to the participants during the workshop. In case 1, facilitators provided other objects such, as the title of the story to support participants' imagination, was provided.

*The phase of the project and collaboration* also affected the use of objects. In case 1 and 2 a totally new service concept was to be ideated. This affected not only the use of objects but also the selection of participants in the workshop. For the aims of these cases, the group did not have to consist of users of the particular case company but rather as potential users. The users managed to take 'an outside of the industry' look which was found useful by the case company. As anticipated, the applied methods seemed to serve best at the beginning or even before a service development process (Holopainen & Helminen, 2011).

In addition, the phase of collaboration, as a temporal dimension, affects the use and creation of objects. In case 3 when starting the collaboration workshop, the facilitator's role was more central in creating and introducing the objects, e.g., going through the process maps and thus transmitting knowledge to the participants. Later on during the workshop, the role the participants increased, as they started collaboratively creating the objects, while the facilitator stayed in the background. The action was

mediated by the objects that the participants were developing, and at the same time they co-created new knowledge.

*The approach of the project* affected the use of objects especially in terms of the empathy-rationality dimension and power distribution. In case 1 empathic design approach i.e. reaching the state of feeling empathy towards others' experience, encouraged researchers to utilize storytelling as a way of guiding discussion and co-creating novel ideas deliberately building on imagination on par with information. This resulted also from the phase of design process; fuzzy-front-end that allows looking for inspiration from many sources to find design opportunities. In the case 2 the building materials such as wooden human figures or stickers played central role in bringing playfulness to the group work and they also allowed everyone in the group to freely participate. Unlike in case 2, where users and developers worked separately to allow comparison of the outcomes, in the cases 1 and 3 the participants' worked in mixed groups and only facilitators and moderators had specific roles and tasks. In case 2, facilitators were not part of discussions because the aim was to give voice for the participants whereas in case 1 the facilitators played a central role in supporting discussions. The case 2 aimed to create knowledge based on the differences between the users' and the developers' understanding and of the future health insurances and the aim was not to create a ready-to-use concept. Case 3 combined both approaches by giving more voice to the participants towards the end.

The evolution of the objects and their use was related to their structuring and power relations between actors (NB: linked with the temporal dimension/phase of co-development). In case 3, the role of the boundary objects evolved so that objects created by the researchers (visualizations, process model, scenario) were in a dominant role in the beginning, whereas later on the boundary objects (action plans) created by the participants were in a central role. The objects at the beginning, the speech bubble visualizations, were characterized by open-endedness, openness for interpretation and loose structuring. Gradually they developed into more concrete and coordinated representations, being at the end focused on facilitating decision-making and realization of the plans. The power and agency was at the beginning concentrated on the researchers but progressively it shifted towards the participants.

Based on our reflection on the cases presented above, we are hesitant to provide a simplified model of using objects in knowledge co-creation workshops because of diverse variables that influence them. We identified



several contextual factors that were used here to discuss the contingencies related to using objects in specific case.

Our study confirms the perception that practice affects the use of objects (cf. Nicolini et al., 2012), but also contextual factors have an effect and need to be taken into account. Furthermore, the findings from our cases were controversial in relation to Nicolini et al. (2012) according to whom the primary objects (epistemic/activity objects) are more important in the early stages of collaboration, followed later by secondary objects (boundary objects). However, in our cases this perception was challenged: the secondary objects (boundary objects) created the space for collaboration, and the primary objects (epistemic, trialogical) came afterwards. This finding is very initial and necessitates further elaboration with more cases. Furthermore, we suggest that understanding contingencies between the purpose of selected object and the way of using it in a collaborative process needs to be studied together, not separately. To conclude, we are aware of many studies regarding of objects in co-development and this paper is our first attempt to bring three cases from three distinct research traditions and contexts together. Our preliminary findings will be further developed and extended to cover more case studies.

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# The living lab approach to codesign solutions for human smart cities: lessons learnt from Periphèria Project

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## ABSTRACT

*Far too many service designers fall into the "touch-points design" trap. Very early in the process, they focus their efforts on mapping, analysing and redesigning customer-facing touch-points throughout the service delivery system. However, this approach is not ideal for service innovation and design projects where the emphasis is on identifying strategic opportunities, framing strategic problems, searching for alternative solutions that can bring transformational changes for complex contexts as cities are. Here design is called to develop 'a project of entanglement of many different design games' and the designer's role becomes that of a collaborator in the construction of 'a meaningful potentially controversial assembly, for and with the participants in the projects' (Enh, 2008).*

*The paper discusses the experience conducted in the context of Periphèria (Concilio and Rizzo, 2012), a European Project started in 2010, in experimenting with 6 different European cities the perspective of Living Lab approach (Amirall, 2008) to boost systems of collaborative services as agents of transformation towards Human Smart Cities. The paper will report on complex participatory processes underlined in this experience and will discuss as a lot of new alliances has been created in the pilots network, but how the strategy of alignment, seems to establish itself as a pattern for engaging stakeholders in innovation throughout the pilots when a series of conditions occurs. These conditions are reported in the end as the principal lesson learnt from the project.*

## KEYWORDS

*Living lab, co-design, alignment processes, constellation solutions*

## DESIGN AND LARGE TERRITORIAL PROJECT SCALES

Over the past 2 or 3 decades the theory and practice of design have changed radically. Following evolutions in technology, economy and society as a whole, design is, not without some difficulty, breaking away from the twentieth century industrial production model. So what we are talking about here is a mix of skills and abilities that can be applied to all fields of

activity where human “industriousness” may find a voice and lead to feasible results (see the definition proffered by ICSID-International Council of Societies of Industrial Design, which states that: “The adjective industrial put to design must be related to the term industry or in its meaning of sector of production or in its ancient meaning of industrious activity” - <http://www.icsid.org>). It follows therefore that design today is an activity where the object of design is more and more frequently not a product, but a service, a kind of social organization or, more generally, a strategic process of transformation. In this framework of particular interests is the phenomenon of living labs as they apply to urban contexts: open and situated environments where to experiments with the urban dimensions and all of the actors that can be founded there. General aim of that new “laboratories” seems to be the realization of a long lasting strategy of change of the specific area/place/space where it operates. In this fluid world the quality and identity of places emerge as the result of design activities promoted by living labs and that impact on the place generating processes which, by transforming the social, economic and cultural context, produce cities. These processes are widely differing dynamic systems, but they are endowed with certain common traits: they have a clear socio-cultural collocation (in other words they are activities that “take place” in the true sense of the word); they have a time (the time of the interactions between the actors involved and between them and the things and the places of reference for that process). Finally, they are strategic activities where case by case the actors are defined according to the nature of the process itself and, above all, according to its ability to attract the partners required and get them to work together.

This phenomenon is what Pelle Ehn (2008) has defined as a new design object that means the realization of a transformation of a current socio technical system into a “socio-material assembly”; a collective of human and non human things Bruno Latour (1999) that takes place “in open public spaces rather than within an organization” (Bjorgvinsson, Ehn, Hillgren, 2009). Among others an example of this phenomenon is Malmo Social Innovation Living Lab (Linde et alii, 2012) is long-life project where, as first action, a huge amount of design activities have been devoted to stimulate people direct participation in the project as well as that of a number of stakeholder from municipality, civil servant, private companies this in order to design and maintain a larger partnership interested in acting and transforming a specific neighbourhood of the city. Another example is that of the Politecnico di Milano Campus Sostenibile project ([www.campusostenibile.it](http://www.campusostenibile.it)). Here through a series of design initiatives the University is trying to stimulate and “shape” a new organisational mindset

that would make more sustainable the relations between the University and the Città Studi neighborhood where the campus is located. By establishing a long lasting project of an open living lab to codesign a system of services that significantly could affect the quality of the human relations in the neighborhood Politecnico of Milano is promoting a large territorial intervention strategically addressing some of the problems that people from the neighborhood perceived as caused by the presence of the campus. Feeding Milan (Simeone, Cantù, 2012) a large territorial service design project that applied to the transformation of the relations between the city of Milano and the surroundings countryside, for example, amplifies and connects existing initiatives and shows the potentials behind their connection and collaboration within a similar vision. Also Life 2.0 (Cantù, Rizzo, 2012) a European project that aims to develop a collaborative social network for elderly people the project started from building up a real community based in a specific neighborhood (in each of the project pilots) and it wants to affect the quality of life of the elderly from the neighborhood in a systemic way showing how everybody can be an 'active' partner for wider transformations of their neighborhood instead of relying on other more mainstream actors.

This paper discusses the results obtained by a three years European project called *Periphèria* that focused on the role of citizens in the Cities of the Future, developing the model of the Human Smart City. Human Smart Cities are those where governments engage citizens by being open to be engaged by citizens, supporting the co-design of technical and social innovation processes through a peer-to-peer relationship based on reciprocal trust and collaboration. In the six *Periphèria* pilot cities, we concretely addressed real problems in real places, co-designing services through collaborative processes while also stimulating local development with new business models for apps, products, services and solutions by establishing six different innovation environments: the arenas. An Arena is an identified place in a given city where a specific mix of Human Smart City ingredients comes together to spark off co-creation processes for new urban services. The Arena concept is based on the idea of Urban Living Lab, but with specific emphasis on the problem-driven identification of a particular city space as the starting point for micro-patterns of human interaction. The paper shows an example of arena as it has been developed in the city of Milano.

## PARTICIPATORY DESIGN AND LIVING LABS

In the tradition of co-design many researchers (Mattelmäki et al. 2007; Rizzo, 2010; Rizzo and Deserti, 2012; Light, 2011) have focused on the potentiality of end users collaborations and prototyping to engage stakeholders in the exploration of innovation. The first one is the dialogue mode, and deals with the processes of collaborative design and tools for engaging users and other stakeholders in collective creative envisioning together and eventually in rethinking the current state. This mode grows from practices that have their roots in close connection with participatory design tradition but also 'beyond usability' research dealing with experience design and empathy. The second one is the prototyping mode that addresses in particular the ways in which designers tend to reflect and make sense of complicated and often yet non-existing things by giving shape, sketching, visualizing and prototyping in various ways. These two modes conceptual are most of the time overlapping in practice and they are today converging to the foundations of those design labs (living labs, urban living labs) that continually envision solutions of possible future by establishing strong connections with the network of stakeholders that belongs to a place (Light, 2011; Yndigegn and Malmborg 2013; Halse et al., 2010; Hillgren et al. 2011) establishing long term engagement with local communities that leads to the emergence of new everyday practices that points to new opportunities for design.

Where living lab approaches originating in technical development work according to Winthereik et al (2009) often have a naïve conceptualization of context of use and an unclear distinction between co-design and evaluation of new technologies. Contrary to living lab approaches that emphasize technology evaluation or adaptation many recent studies are discussing a situated and human centred approach when design open a laboratory space for communities to develop innovation: Rizzo and Manzini (2011) work directly from the particular conditions and resources of the local community in order to employ relevant service systems that may facilitate social innovation. Scalability in this approach comes about not through the similarity between communities but through the robustness and generic qualities of the service design concepts. Another good example of this context dependent living lab is in the Messeter's study of how social media is used in challenged neighborhoods in Cape Town (Messeter, 2012).

In a world of heterogeneity of use and users and entanglement of infrastructures and practices design laboratories that span from envisioning new configurations of design in use to the incubation of emergent patterns of appropriation provide a platform for engagement that transcends

traditional models of research and development. A challenge for such a platform is to provide evidence for what can be accomplished beyond the laboratory. The Periphèria project has tried to answer to this question by establishing six different open innovation environment in six European cities with both aim: addressing problems of the contexts; establish a long last strategy of innovation for that context characterized by:

- a dedicated urban lab;
- a co-design approach as complex participatory process that put together citizens private and public stakeholders in a new model of partnership;
- a focus on collaborative services: i. e. those services where citizens have a role in maintaining and delivering them.

### PERIPHERIA PROJECT: CHALLENGES AND OPPORTUNITIES FOR HUMAN SMART CITIES

Cities are all facing today big epochal challenges that are calling for a transformation in the way we all work, live, play, and build our future, which in turn places a special burden on those of us holding the responsibility to govern such processes with an optimum usage of the public resources available. To respond these challenges cities are more and more considering opportunities offered by the “smart city” idea towards a sustainable growth and well-being; smart cities envisioned as contexts where whatever interaction is mediated by technologies. Many solutions, even integrating different perspectives in order to consider the complexity of the urban environments, are being proposed to cities mainly based on heavy infrastructuring and driven by the technology market. Most of these solutions keep technologies out of the urban environments, far from being considered components of the urban functioning and, furthermore, even farer from people and their urban spaces.

Human Smart Cities, the core of Periphèria project differently recognize these trends as inspiring for a citizen driven smartness. Human Smart Cities recognize that cities are the best environments for experimental dialogues on urban future taking into account citizens and their powerful connectedness made possible by future internet technologies.

The Human Smart City (HSC) concept is built on emergent, sustainable models for urban living, working and governance enabled by Future Internet infrastructures and services. At the core of the vision is the human perspective, as gained through the application of citizen-centric and participatory approaches to the co-design, development, and production of



Smart City services that balance the technical “smartness” of sensors, meters, and infrastructures with softer features such as clarity of vision, citizen empowerment, social interaction in physical urban settings, and public-citizens partnership. The HSC approach is gaining increasing support from city governments across Europe as well as the Smart City research community, as it more effectively addresses key challenges such as low-carbon strategies, the urban environment, sustainable mobility, and social inclusion through a more balanced, holistic approach to technology.

This vision is labelled ‘Human Smart City’, which focuses on people and their well-being rather than just ICT infrastructures and dashboards alone.

With the above trends in mind, the peculiar Smart City approach feeding Periphèria activities is mainly rooted on the idea that smart is a city where people, citizens, stakeholders are the main actors of ICT driven urban development. In such a “Human Smart City”, users do not simply adopt the technologies chosen and acquired off-the-shelf by their municipal governments; instead, the appropriation by citizens of even the simplest, most frugal innovations is strongly consequent to people first manifesting their Wishes-Interests-Needs and then developing the ability to provide adequate solutions through interactive, dialogic, collaborative processes with the public sector and the ICT solution providers. The traditional buyer-seller (or commissioning) relationship is overcome by new forms of public-private-people partnership (in line with the Living Lab methodology), having more the form of alliances, synergies, service level agreements rather than negotiated relationships, thus sidestepping the issue of vendor lock-in. In such a Human Smart City, new and innovative market opportunities for ICT and Future Internet based public services can be created, deeply rooted in the real problems of people, in their urban daily lives, in their commitment to respond proactively to their own WINs.

Within these trends, Periphèria considers urban living labs appear able to create conditions to set up and generate innovation ecosystems where people in places can develop peer-to-peer dialogues with their administrations also using technologies, which are considered enablers of new private-public people partnerships where governments are reconceiving their roles: they are becoming able to engage citizens by being open to be engaged by citizens, supporting the co-design of technical and social innovation processes through a peer-to-peer relationship based on reciprocal trust and collaboration.

## MILANO PILOT: A URBAN LIVING LAB BETWEEN A CAMPUS AND ITS NEIGHBORHOOD

The Periphèria Milan Pilot starts in 2011, when Politecnico di Milano decides to activate the project “Città Studi. Campus Sostenibile” ([www.campussostenibile.it](http://www.campussostenibile.it)). The Pilot takes into consideration that academic campuses are relevant urban areas where the kind of knowledge circulating and the aptitude towards experimentation makes them suitable for LL approaches. Coherently with this vision, the main stakeholders involved in this first phase of the project are the academics, the students and all those directly connected to the campus life. Two main drivers are considered as activators of the campus community commitment: 1) conditions, situations, mechanisms, logistics, and practices making the campus an unsustainable environment; 2) ideas, blue prints, visions, analysis and hypotheses developed by the campus communities to transform it into a sustainable environment.

Stakeholder, people, actors motivation has been and still is evolving throughout the process. Some of the stakeholders showed a constant interest in the initiative and process and are sort of leaders, heroes of the whole story: those that are carrying on the projects. Some others are in a sort of “available” condition: these are following the process but doing only what is required without any proactive initiative. Some others are only curious, they are in a sort of standby condition waiting for thinks to be more active and producing much larger and wider impact (these are not actors of change but are not breaking the process).

The Campus pilot experience is showing that the most effective approach for engaging people is being discovered throughout a chain of attempts representing themselves micro experience for learning and for saying their opinion, needs, desire, wishes. The process is that of helping a community to grow up by offering them occasions of meeting and exchange, tools for understanding the problems and envisioning the solutions (learning by doing process). It is now possible to say that three main service ideas developed within the project are mature enough to be discussed. Two of them, the “TOC TOC” and the “&CO” initiatives, are examples of bottom-up service co-design experiences, coordinated by the pilots’ coordinator but mainly carried on by the students. The third one is configured as an inter-institutional interaction experimental lab between Politecnico of Milano and public representatives active in the area of Città Studi. Since the beginning two issues appeared to work well: the transformation of Piazza Leonardo da Vinci (the main square of the area, in front of Politecnico) and the role of sport activities in the rehabilitation of public spaces.

## TOC TOC service idea

TOC TOC is a collaborative service built with a LL approach with the aim of creating a living community behind the “Campus Sostenibile” project in the framework of Periphèria. The idea is to involve the community that surrounds the campus (citizens, local retailers, schools, municipalities, NGOs) in a service that supports exchanges of material and immaterial things among people by exploiting a web platform and a mobile app.

The mission of the service is twofold: (i) foster sociability through a web-based living community, for mutual help; (ii) reduce consumption by re-use and exchange.

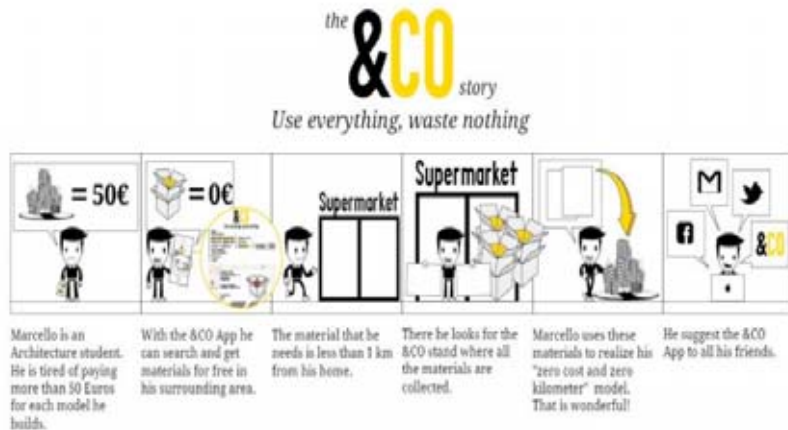
Currently the service is at a prototypical stage (picture 1) that has been developed by activating a robust process of co-design with students, professors, people from the neighbourhood and software developers: it started from understanding how does exchange take place between people that do not know each other, and continued by co-designing the business model and the best features for the marketing strategy and the more suitable technologies for the service (smart matching system, open system – APIs).



Picture 1. The TOC TOC prototype

## &CO service idea

&CO project aims at reducing the amount of waste in big and middle size cities by lengthening the life-cycle of materials. The initial target of the &CO project, within the framework of the Periphèria project, was the ideation and the design of a collaborative service in order to boost social innovation in Smart Cities. The final goal about waste reducing has been focused thanks to a process of co-design with the different communities (students, inhabitants etc.) in the Città Studi neighbourhood. In particular, &CO project tries to answer with a Living Lab approach to a specific challenge about the behaviours of people living in the Campus. Its aim is to limit unsustainable behaviours by changing life-styles and ways of use. Currently the project is under further development in terms of its concept (Picture 2).



**Picture 2. The &CO Storyboard.**

### Piazza Leonardo da Vinci

In order to enlarge the participation to “Campus Sostenibile” and Periphèria initiatives, a dedicated forum has been activated within the participatory platform of Milano ([www.partecipami.it](http://www.partecipami.it), see Fig 3): this captured some more people to enter the City Table and to be involved in the whole process of experimenting within the Politecnico of Milano Neighbourhood. Similarly some events have been organized in the Piazza to capture the attention and the interest of more people and families; the PLANUM association - that was involved with the task of engaging people during one of the WSs - has organized these events (See in picture 3 and 4 some of these events).



**Picture 3. The forum activated on PartecipaMI on the Piazza Leonardo da Vinci.**

Moreover several students' WSs and master degree theses were activated on the specific issue of the Piazza. The results of these activities were presented at the end of July 2012 to citizens, the local city council and the Milan municipality, during a WS dedicated to the discussion of the Piazza issue.

During this occasion an agenda has been set up for future collaborative works oriented to develop a strategic plan for the area and plan some small intervention to experiment possible alternative new functions in the Piazza.



**Picture 4. Activities for engaging new people in Piazza Leonardo da Vinci**

This issue of sport in piazza has been selected as an alignment driver of the Milano Pilot. The reasons for this choice are twofold: first, PoliMI manages two municipal sport infrastructures in the area and this is not well accepted by the Città Studi citizens because they would prefer a wider plurality of uses and users of the infrastructures; second, the occasion for the activation of a infrastructure-independent vision of sport activities emerged during one of the initial workshops provoked by the participation of the municipal sport delegate at the WS. The idea is to look at sport as a driver for public space creation and structuring.

## CONCLUSION

As the stories of the Milano pilot shows a Urban Living Lab is an open environment that is able to integrate, within a design thinking approach, creative citizens and communities, with collaborative enterprises and participative institutions in the production of collaborative services from the micro up to the urban scale thus being able to make the city making a process of socio-digital innovation towards a Human Smart Cities model.

Urban Living Labs promote:

- highly dynamic processes: they include linear co-design processes and consensus building methodologies (i.e. the most traditional view on participatory design), but they can go far beyond them, becoming complex, interconnected but, often, contradictory processes.

- Creative and proactive activities, where the designers' role includes the role of mediator (between different interests) and facilitator (of other participants' ideas and initiatives), but involves more skills and, most importantly, it includes the designers' specificity in terms of creativity and design knowledge (to conceive and realize design initiatives and their correspondent design devices).
- Complex co-design activities that, to be promoted, sustained and oriented, call for prototypes, mock-ups, design games, models, sketches and other materials: a set of dedicated and designed artifacts.

In order to establish long last strategies of changes towards Human Smart Cities by implementing networks of micro-solutions promoted by partnerships between collaborative services, collaborative enterprises and collaborative institutions and empowered through the realisation of collaborative services.

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# Online Focus Groups - New Tool for Concept Testing with Remote Users

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## ABSTRACT

*In this paper, we describe the development and testing of an online focus group tool prototype. The tool was designed in response to an emerging problem in new product development, namely collecting feedback on early product concept from globally dispersed users. In collaboration with a company, we developed a software solution for a synchronous, remote focus group. In practice, we produced a hybrid system combining features of a remote panel and a focus group. We describe the arrangement and outcome of three test sessions around the experimental system and the concept development. Overall, our results with the system were positive both for the users and the client company. This demonstrated the feasibility and desirability of online concept testing in early product development. We discuss the lessons learned for the design of improved online focus groups in future, which we believe will open up new opportunities for the fuzzy front-end of product development.*

## KEYWORDS

*User-centred design, New product development, Concept design, Market research, Remote panel, Online focus group*

## INTRODUCTION

The design of new products in the 21<sup>st</sup> century requires an increasing amount of involvement from users. Concept testing has been a part of marketing research for over 40 years (Wind, 1973; Iuso, 1975). Broadly defined the idea of a concept test is to “solicit a direct response to a description of the product concept from potential customers in the target



*market.*” (Ulrich & Eppinger 2000, p. 176). Moore (1982, p. 279) states that the primary aim of concept testing is “*to estimate customers reactions to a product before committing substantial funds to it.*” Ulrich and Eppinger (2000) also underline that the differentiating aspect of concept testing from other phases of concept development activities -such as the closely related phase of concept selection (both aim to narrow the set of alternatives) or prototyping (both involve representation of the product concept) - is that concept testing is based on a data gathered “*directly from potential customers and relies to a lesser degree on judgements made by the development team.*”

Moore (1982) differentiates three types or “sequences” of concept tests. The purpose of *concept screening test* is to narrow down the amount of ideas to a more manageable set. *Concept generation test* aims to end up with a concept statement that tells “all” about the product. The *concept evaluation test*, where consumers evaluate the concept using set of evaluation items (Moore 1982; see also Peng & Finn, 2008). This paper focuses on concept evaluation.

Traditionally concept testing in large companies has been the responsibility of the marketing department. Marketing research has engaged users either independently and remotely as in telephone panels, or interactively in small collocated groups, as in focus groups. However, this approach can be problematic if the users are dispersed around the world, or the visual concept cannot be adequately presented over the phone. The challenge is, how to receive remote user opinions on new product concepts?

With the evolution of information and communication technologies, we have seen the rise of various new remote collaboration tools, which could help to resolve these problems. Group support systems and other electronic systems, such as those designed for brainstorming, are currently actively studied as a part of computer-supported collaborative work.

*Online focus group* (OFG) is one promising method to get in touch with customers and users over the internet. For few years now, there have been commercial solutions for conducting online focus groups (e.g. VisionsLive version 2.0 launched in 2011), but according to a Finnish market research company, their utilization is still minimal. Although the OFG method has been studied in various fields, there still is a lack of research on how to utilize this method in new product development (NPD) and co-design.

In this paper we provide insights on the use of online focus groups in developing new products with users by reviewing the literature and documenting the development and testing of an experimental OFG system.

## Background

In this section, we will briefly review the most important existing studies and technologies relevant to product concept testing and OFGs. There is limited information available about the use of test methods in NPD. Peng and Finn (2008) studied the most used and favored concept testing methods in industry by gathering information from product managers. They targeted a survey at managers who are responsible for NPD and received 51 usable responses. The companies were 20 percent industrial, 14 percent service, 18 percent package, 16 percent durables and 33 percent others. They asked the respondents to state which of 13 possible NPD models and methods were used in the respondent's organization during the previous three years.

Their study results showed that the most used models and methods in years 2002-2004 were *concept tests* (77 %), *focus groups* (66%) and *limited rollout* (53%). The most commonly reported objective was to develop the original idea further (78%), eliminate poor concepts (66%), identify the value of concept features (66%) and identify the highest potential customer segment (53%). The degree of satisfaction with the methods was also measured. The managers are the most satisfied with concept tests, the second most with show test and clinics, and thirdly with focus groups. Thus, according to Peng and Finn (2008), there is a relationship between the frequency of use and the relative satisfaction with a method. Their study also revealed that the most desired improvements for concept testing was to use online testing more.

## Groups

Time and place are defining features of group work. Klein *et alia* (2007) point out that there are four possible configurations of computer-supported groups: same time/same place, same time/different place, different time/same place, different time/different place. The first two configurations are referred to as *synchronous* focus groups and the latter two to as *asynchronous* focus groups. It is assumed that group dynamics evolve differently in these different settings.

Traditional collocated face-to-face focus groups are characterized by their explicit use of “*group interaction to produce data and insight that would be less accessible without the interaction found in the group*” (Franswoth & Boon, 2010, p. 607, ref. Morgan, 1997, p. 2). The fact that the methodology is based on a collective understanding of participants' view makes it differ from many other qualitative research methods such as one-on-one interviews (also group interviews) or observations (Ivanoff & Hultberg,

2006). Parent et al. (2000, p. 49) even state that focus groups are considered as “*the most effective manner in which to qualitatively discern consumer wants, preferences, and opinions, in other words consumer knowledge about the product.*” When discussing focus groups, we should keep in mind that in addition to participants, the groups rely heavily on the contribution of a *moderator* (facilitator), typically a market researcher.

An online focus group is a focus group moved online - people in different physical locations form a group in an online environment, for example, using chat rooms or discussion boards. The benefits of conducting focus groups online are lower costs and the ability to bypass space and time constraints (e.g. Easton et al., 2002; Reid & Reid, 2005). Previous studies comparing face-to-face focus groups and online focus groups in various tasks have concluded that online groups maintains their functionality and can produce useful data without compromising participant satisfaction (e.g. Nicholas et al. 2010; Easton et al. 2002; Reid & Reid, 2005; Underhill & Olmsted, 2003). There are differences, for instance in increased intra-group conflict (Underhill & Olmsted, 2003) and increased equality of participation in online groups when compared to collocated groups.

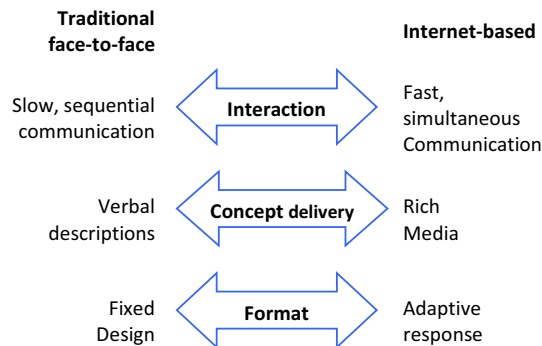
There are some unknowns in the domain of online groups. Klein et al. (2007) discuss the influence of national culture, communication style, and power distance. It is assumed that each of these will differently present themselves in an online setting. For instance, the possibility of anonymous interaction could counterbalance the influence of power distance and different communication cultures could add new challenges to globally distributed groups.

### ***Synchronous Remote Groups in Concept testing***

The studies looking at OFGs as a way to test new product concepts are nearly non-existent to our best knowledge. This is in contrast to studies of usability, for instance, which have effectively been transferred into online formats with good results (Madathil and Greenstein, 2011).

Maybe the single tangible study is almost 12 years old. Dahan and Hauser (2002) discuss the possibilities of online customer research and state that new technologies add capabilities for *communication*, *concept delivery*, and *format* (see Picture 1 on the following page). In comparison to paper and phone-based solutions, Internet can provide much faster and simultaneous interaction between the NPD team and the respondents. The web also enables communication with a larger number of customers in multiple locations and makes the information collection faster. Concepts can also be communicated in multiple formats, for example, graphically

and aurally. Finally, adapting web-pages in real time enables stimuli to become interactive, more informative, and personalized. They provide six examples of what can be achieved online, including user design, virtual concept testing, and conjoint analysis. However, their work was clearly ahead of its time and did not quite predict the future development and adoption of technology.



**Picture 1 Three dimensions differentiating traditional collocated and remote synchronous group elicitation methods (adapted from Dahan & Hauser 2002)**

### ***Makings of a concept test***

How should concept testing in general be organized? This requires defining at least the structure, materials, and participants for a study (Moore, 1982). The preparation of written materials is important. Moore advises that the writing of concept statements should be done carefully. He postulates that *“the amount of positioning and sell is a function of how great the benefit is, how well it is understood, how socially acceptable it is to admit a certain need, and how emotional the benefit is.”* (*ibid.*, p. 287) This emphasizes appropriate concept statements and questions asked.

Roto *et alia* (2009) note that the initial concept descriptions are one of the main challenges in early evaluation. They caution that an excellent concept idea can suffer from unclear or dull presentation and if comparing different ideas evaluators can “prefer a less promising concept because of its appealing presentation.” (*ibid.*, p. 4.) In order to avoid these biases, the authors advice to make sure that the representations are easy to comprehend and that all the descriptions are at the same level. One way to strengthen the materials is to have them prepared by the same designers.

There is also the question of group session structure, for instance, how structured versus open-ended the questions or arguments presented to the participants are. Reppel, Gruber, Szmigin and Voss (2008) studied how laddering interviews could be translated into online format. The idea of the laddering method is to create a deeper understanding of the attributes most

valued by consumer in a product, i.e. “*researchers can examine the consumer’s individuality in depth while still producing quantifiable results.*” Their experiment compared text-based online techniques for laddering. Their results demonstrate that laddering interviews and questionnaires can be successfully transferred to an online environment, but it is more effective as an interactive interview rather than as a stand-alone, unmoderated web application. Reppel et al. (2008)

An important decision regards the participants. It is usually recommended that the product concept test should involve people who are current or potential users of the product. However, Hyysalo (2009) notes that just the belonging to a user group is an insufficient criterion for participation. Occupational group, hobbies, age group and the ways of using the product, to mention few, can make a crucial difference when concerning different product concepts and their evaluation. Another requirement is that the group should be composed of participants who are relatively homogeneous and previously unknown to each other (Easton et al., 2003). Peng and Finn (2010) state, that the quality of the data can be improved by screening the participants, especially when testing radically new concepts.

To recap, we found a lot of discussion and examples on the potential benefits of online concept testing in the literature, but no documented explorations of performing it with product concepts.

### ***Present study***

In this exploratory study we developed an online focus group solution for solving a NPD challenge of Vaisala, a Finnish high-tech company operating globally. They wanted to find a solution to get feedback on incrementally new product concepts from users and clients that are distributed around the world in small numbers. In response, we presented them with a chance to co-develop an OFG tool, which would be a hybrid of an online panel and a focus group.

The client company provided the case materials and access to representative users for the user study reported here. Some details of the case are omitted due to confidentiality reasons. The aim of our study was to find out how this kind of same time/different place online focus group functions from the viewpoint of concept evaluation. Consequentially, we simultaneously tested the method and a new product concept.

## TECHNOLOGY SOLUTION

The experiment was based on Presemo, an interactive system “for creating interactive presentations that encourage active participation” (Liikkanen *et al.*, 2011). The prototype system was accessible over a normal web browser in an address provided to the participants over email. It has two roles: *administrator* and *participant*. The session was controlled by an administrator (a researcher) who had prepared the materials for testing using a dedicated software. The materials resembled a Powerpoint slide show with interactive features. In this case, we presented 32 web pages or “slides”, most interactive including structured (closed) and open-ended questionnaire items (illustrated in Picture 2 below) and a text-based chat. The pages were advanced by the administrator, creating an experience of observing a dynamically updated web page.

Participants were asked to join our session at a given time from anywhere they liked. They used nicknames chosen at the beginning of the session. Additionally, we established a voice channel through Skype internet voice messaging software, rendering the session not totally anonymous. This voice channel was intended for one-way communication so we would be able to present the concept and give instruction while the participants provided their comments and responses in the web browser only by typing. In the chat, the participants could see and react to others’ input (public items), but in other items (private) they were not aware of other participants’ responses or progress.

The screenshot shows a web browser window with a title bar that says "Purchase and installation". The main content area is divided into two columns. The left column contains two photographs: the top one shows a person in a military-style jacket working on a white surface, and the bottom one shows a person in a blue shirt working on a white panel mounted on a pole. The right column contains a structured questionnaire item with a 3-step response scale. Below the photographs, there is a text input field for an open-ended response. At the bottom, there is a "Send" button.

Purchase and installation

The customer can either install the system by himself, or order an installation service for an additional fee.

Select your preferred option:

Installation by self

Installation service

Describe in brief, how you feel about these two options?

How much would you be willing to pay for the installation service?

Send

**Picture 2 Internet browser screenshot from the participant view in Presemo Online Focus Group.**

**On top of the view, there is a pictorial stimulus with a verbal description.**

**In the middle there is a structured questionnaire item with 3-step response scale.**

**On the bottom an open-ended response field.**

**Chat window is not illustrated but would look identical except for the text input provided by other participants.**

## METHODS

An exploratory research approach was followed to design a study in the fashion of “research for design” as typically practiced in human-computer interaction studies (Zimmerman, Forlizzi & Evenson, 2007). This meant that we develop the prototype iteratively between the tests with users.

We first organized two pilot tests to test and develop the new technology platform as well as to test the materials for this context. The two pilot tests were conducted with three or four participants per session (Finnish) and the actual study with six participants (international). In total the duration of a session was approx. one hour. A company representative was moderating the session with international participants and other company representatives were present at an earlier pilot session in Aalto University premises to observe the test.

After the session feedback was collected from the participants using a group interview and a questionnaire. We also interviewed the representative of the client organization. In Results, we present our preliminary analysis of the main observations made during the research and design process. Our approach is qualitative and data-driven, with the aim of providing the reader the essential lessons learned in the process.

## RESULTS

The method succeeded in communicating the concept to and in eliciting relevant information from the participants. This was considered directly useful for product development. Even while considered successful, the tests surfaced several issues related to the arrangement and execution of online focus group sessions. These included insights concerning the communication between moderator and participants, the role of the group moderator, computer literacy, question positioning and participant interaction, as well as participant recruitment. Next we will discuss each of these critical design and execution details.

*Communication between the moderator and participants:* It should be made clear in the beginning of the session how the communication is going to be organized (vocally or textually) during the session and consistently follow the same procedure through the session. According to the feedback it was preferred that the moderator was the only one having a voice and being able to talk aloud in the “discussion.”

*The role of the group moderator:* Besides an adequate understanding of the subject, the moderator should also possess an adequate knowledge of the technology used in the situation and be able to make use of it. Also some clear steering in the situation is needed. Simultaneous control of the system, tracking the participant input, and verbal moderation pose a more challenging setting than a traditional face-to-face focus group. Therefore it is recommended to utilize more than one moderator with different roles.

*Computer literacy:* People do have different technological skills and some are for example slower in typing than other people. This is a fact that must be acknowledged. The effects of this variance can be countered either technologically or procedurally. The group moderator may for example acknowledge this in the beginning of the session by explicitly stating that there is no hurry in providing answers. Also, functionality where the moderators are able to monitor participant activity in real time (e.g. whether the participant is still typing) helps in regulating the pace of the session and avoiding moving forward too early.

*Question positioning and participant interaction:* It should be pondered carefully what kinds of questions stimulate conversation and which do not (cf. Moore, 1982; Roto et al. 2009). It also should be noted that the moderator could play a key role in enhancing the interaction between the participants by using the platforms interactional possibilities. As the interaction is more limited than in a face-to-face focus group (e.g. visual cues of reactions to presented questions), the importance of careful consideration of how the questions are presented is highlighted.

*Participant recruitment:* It should be secured that the participants' knowledge of the topic of the discussion is in the level that they are able to answer the questions presented to them. We had some issues in our initial screening for the pilot study and quickly had to revise the screening.

From the interviews and surveys presented, the overall reception was favorable by both Vaisala (client company) and the participants. Participants made several positive remarks of the research method. People appreciated the fact that they could participate from any location. Another positive observation was that the platform enabled the participants to produce their answers textually. When asked from the participants all preferred textual over vocal answering. The slightly over one hour session was not experienced as tiresome by the participants.

Another perspective of the results concerns the feedback generated for the client company. As an instance a focus group, the client received both "quantitative" results from the structured questionnaire items and



qualitative input from the focus group discussions and open-ended items. The representative of the client also expressed their gratitude in the findings, even if we did not quite achieve the number of participants initially hoped for. However, we felt that the full potential of the focus group was not yet achieved, as the level of interaction between participants and the depth of discussion in the open items remained relatively shallow. The communication around the test was also at times lacking and few times participants resorted to using the Skype voice channel to ask questions. However, participants generally felt that the voice channel was best left for the exclusive use of the moderator.

## DISCUSSION

In this exploratory study we tested an online concept testing system. A hybrid of a structured online panel and interactive focus group. This was shaped by the needs of the contracting company and their specific concept test. Our study provides a proof-of-concept for the online focus group method as an efficient and useful method for gather feedback; for collecting and understanding user preferences.

The main benefit of an OFG method is that it enables dispersed user participation from any location where an Internet connection is available. There are several other advantages of the method including flexibility and adaptability. They provide possibilities for moderating the interactions not attainable in face-to-face situations, as well as the automatic recording which makes time-consuming transcription and note taking redundant. However, many of these features are yet only promises of future.

### ***Future work***

Developing the system and understanding the dynamics of this interactive technology is a nontrivial challenge. Constant changes to the system were required in order to fine-tune the software prototype for our OFG. There are several venues to future work both in research and development of this type of interactive co-creation tool.

One of the most important challenges for a remote group system is *moderator awareness* of the situation and participants. For instance, is everyone present, are they participating in the discussion, and responding to items? This is a clear point of technology development, which might potentially greatly improve the usefulness of the approach. It could be developed into the direction of “facilitated” moderation in which passive participants could be semi-automatically urged to participate and private

messages to and fro the administrator and the participant sent. This could increase interactivity and generate more insights.

Another feature to develop further is *automatic* data aggregation and visualization. In the present setup, it was essential that the moderator (or a domain expert observer) was a representative of the client company in order to get insights from the feedback and answer questions participants sometimes had about the concept.

The sharing and generation of insights from the data collected with computer tools is currently a big issue for this and similar tools. As long as the data sets are small, this is manageable, but if a company would like to test several concepts separately in parallel or perform A/B testing, the data processing would be cumbersome with the current tools. This is in contrast with the execution of OFGs. This brings us to another question, which is the group size. We have not discussed the scalability issues here, but we believe that without new technical solutions, traditional group size restrictions (6-10 participants, cf. Easton et al. 2002) apply. Much depends of participants' activity and the structure of the session even with assistive technology.

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# Effectiveness of Co-Design Intervention – Adopting Service Co-Development Thinking

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## ABSTRACT

*This paper presents first findings from a case study exploring the effectiveness of co-design interventions in the context of service co-development. The research approach was qualitative, comprising of three cases. Data was collected from follow-up interviews with organizations that have participated in researcher-led co-design interventions. As theoretical lens for analysing the case data we use theories of knowledge creation, service research, and process thinking, aiming to form a holistic understanding of the phenomenon studied. As a result we present a categorization of the service co-development interventions' effects. Our findings indicate that the effects occur on two levels: thinking and practice. Furthermore, we argue that especially the use of visual boundary objects is crucial for the effectiveness of the interventions.*

## KEYWORDS

*Service co-design method, intervention, process thinking, knowledge co-creation, community of practice*

## INTRODUCTION

During the last decades the developed economies have become dominated by services. Recently, the challenges created by globalization and tightened competition has reached not only the corporations but also the public organizations. To succeed in the current environment, the organizations developing and providing services have become to an increasing extent aware of the significance of user-centeredness in service development. This has raised the core question: How to design and develop services collaboratively with various users and stakeholders? The question has

awakened the interest of both researchers and practitioners in various fields. In close collaboration, researchers and service organizations have conducted numerous action research projects with service co-development interventions including, e.g., facilitated process simulation days, co-development workshops, and co-design sessions, all aiming at idea generation and enhancement of the service co-development capabilities.

However, little attention has been paid on the effectiveness and long-term impacts of the co-development methods and interventions (e.g. Steen, Manschot & De Koning, 2011). It has remained unclear whether the organizations participating in the workshops and other service co-development events have adopted the methods and mindset of co-development, and what kind of organizational learning or change the interventions have elicited, if any. In this research we explore and evaluate the co-development methods' effectiveness and long-term impacts in the case organizations with a follow-up interview study.

In this paper we (1) describe three different cases where service co-development methods were applied as a part of researcher-led interventions, and (2) aim to identify and categorize the effects and long-term impacts of the co-development interventions in the case organizations from two perspectives: (i) the service production and (ii) the service co-development practices.

We answer the following **research questions** based on the analysis of our empirical data:

- RQ1: What kinds of long-term effects have the co-development methods and interventions produced in the case organizations?
- RQ2: How can the effects of the interventions utilizing co-development methods be categorized?

The rest of the paper is structured as follows: First, the theoretical background and central concepts are presented, followed by a description of the case study methodology and data. Next, the findings of the study are presented, followed by the conclusions.

## THEORETICAL BACKGROUND

As services and their development are a multifaceted phenomenon, the knowledge of several disciplines is needed to understand and develop the theory dealing with services (Spohrer et al., 2007) and to capture the effects of the service co-development interventions. Thus, the theoretical background of the study is multidisciplinary, combining theories and

concepts from the service development literature, process thinking, and learning sciences to form a more holistic understanding of the researched phenomenon. In our view this combination of theories opens a novel perspective on studying the impacts of service co-development methods. First, we conceptualize the service co-development and interventions with the help of service marketing literature. Second, we present the networked process view on services, and third, we introduce the knowledge creation view on service co-development.

### **Defining ‘Service Co-development Interventions’**

The targets and the level of the service development vary in organizations. For example, the activities of an organization can aim at designing a new product, improving its existing service or re-engineer an internal or networked process. For clarity, in this paper we define all the collaborative development activities under an umbrella term of *service co-development* and study how *interventions* can affect it. Next, we will define these terms with the help of literature.

The term *service* emphasizes the dominance of services in the current economy. Today, more than two thirds of the gross domestic product of the developed countries is produced by the service sector. In addition, even the value of physical products is now seen through the services they render (Vargo & Lusch, 2004), implying that the elements and assemblies of the services should be taken into account in all development work. Also the three cases analysed in this paper are all conceptualized as services: school and education models as a service and innovation process as a service.

An alternative for the word *development* would be e.g. the terms *design* or *engineering*. The *development* term has its roots, when discussing service development, in the Anglo-American literature of the 1970s and 1980s by the concept of *new service development*. Parallel to the development term, the *engineering* term was used in Germany and Israel with the *service engineering* concept in the mid-1990s (Bullinger, Fähnrich & Meiren, 2003). The main difference between the concepts is the approach they have towards development. The *new service development* is marketing-oriented whereas the approach of *service engineering* is technical-methodological. The marketing-oriented approach has created yet another term in the field of service development in early-1990s, the *service design*. The orientation of *service design* approach is in the experiences of the customers. The *service design* emerged from the tradition of product design and interface design uses creative design methods to visualize, formulate, and choreograph service solutions to problems that do not necessarily even exist

yet. (Erlhoff, Marshall & Bruce, 2008) On the other hand, the term *design* in service context can also be seen only as a part of a bigger service development process of several phases (e.g. Edvardsson et al., 2000).

The *co-* (short for *collaboration*) part of the umbrella term *service co-development* underlines the importance of collaboration and participation across the functions of an organization, between the organizations within a network, and especially with the users and front-line employees of the service. Co-design (nuances between the terms *design* and *development* explained above) is simply about empowering people, usually potential users, who have not traditionally been part of the design process (Mattelmäki & Sleeswijk Visser, 2011). Even if the terms like co-design, co-creation and co-development have only recently become frequently discussed themes in scientific literature and professional magazines, the practice of collaborative creativity and collaborative development have been around for nearly 40 years under the name of participatory design (Sanders & Stappers, 2008). In Scandinavia the roots of user participation in design date back to Norway of the 1970's where an R&D project related to the use of computer applications at the workplace applied so-called collective resource approach. The value of involving users has traditionally been most notably realized in the field of human-computer interaction and design research, but also the literature of organizational management has recognized the importance of empowering wider range of people in the development work. For instance the participation of employees has been seen as a critical requirement for successful change already since the 1960's (Smeds & Pöry-Lassila, 2011).

In this paper the term *intervention* refers to a series of external researcher-led or practitioner-led facilitated face-to-face workshops organized for the stakeholders of a case organization or its network. In the intervention workshops the facilitators use creative methods to trigger and guide the development-related discussion and co-creation work. In all three cases' interventions various co-development methods (e.g. process simulation, future recall, design game, personas and scenarios) were applied in tailored configurations. However, all three intervention workshops were based on the SimLab™ business process simulation intervention method (e.g. Smeds & Pöry-Lassila, 2011), and the other methods were added on the SimLab method. The co-development methods were used in different combinations depending on the case, and all methods relied on working with boundary objects or other artefacts, and on process facilitation.

According to the SimLab method, the intervention or simulation workshops are typically divided in two main phases: plenary group discussion and

parallel small-group ideation work. In the first phase, the whole group participates in the same discussion that aims at generating a shared understanding of the current situation, or the service to be developed. Visual boundary objects are used to support the forming of shared understanding. The second phase, which is carried out in smaller groups, typically aims at ideating new solutions and ways to implement the improvements. During the second phase the participants usually co-create their own boundary objects that support the discussion and represent the results of the ideation. (Smeds & Pöyry-Lassila, 2011)

### **Networked Processes: Effects on Case Organizations' Service Production**

As mentioned earlier, the three researched cases were conceptualized as services. Looking into the characteristics of services and physical products, the service marketing tradition states that the only clear distinction between them is the **process** nature of services (Grönroos, 2006). Services are defined as processes where service providers and customers interactively co-produce the value during the consumption of the service. The collaborative nature of services causes that enterprises and other organizations cannot deliver value as such, but instead offer value propositions for value **co-creation** (Vargo & Lusch, 2008). For this reason service organizations should concentrate on developing the proper prerequisites for their services (Edvardsson & Olsson, 1996), and see themselves and act as integrators of resources that are spread over the service provision **network** (Vargo & Lusch, 2008).

Edvardsson and Olsson (1996) divide the prerequisites into three basic components: *service concept*, *service process* and *service system*. The *service concept* describes the primary and secondary needs of the customer and the core and support service offer of the company. The *service system* model includes the resources – the service company's staff, the customers, the physical/technical environment, organization and control – available to the process for realizing the *service concept*. The *service process* is the chain or parallel and sequential activities, which creates and delivers the actual service. (Edvardsson & Olsson, 1996) According to Edvardsson et al. (2000) the main task in a service development process is to create the prerequisites for services, and the components of service prerequisites are to be developed simultaneously due their interdependent nature.

The service co-development interventions' effects on service prerequisites are in this paper analysed through attributes of co-creation, processes and network. The **co-creation** attribute includes elements from developing



*service concept* prerequisite; **processes** attribute derives from *service process* and *service concept* prerequisites; and **network** attribute from *service system* prerequisite.

### **Knowledge Sharing and Creation: Effects on Service Co-development Capabilities**

In this study we approach the phenomenon of service co-development also from the knowledge co-creation view that originates from the learning sciences. The strength of this view is its ability to explain how new knowledge is created in social interaction between participants. Here, we apply this view in the context of services to identify the central interactional elements in the co-development interventions.

There have been two main metaphors for conceptualizing learning: the knowledge *acquisition* by learners and *participation* to social interaction (Sfard, 1998). The acquisition metaphor of learning builds on the basic idea that knowledge is something to gain and to possess. Human mind is seen as a knowledge container and learning means filling the container with new knowledge. The participation metaphor emphasizes that knowledge and knowing are connected to the situations where they are used. Knowledge does not exist in the minds of individuals but in the participation in cultural practice (Lave & Wenger, 1991). The acquisition metaphor of learning can also be called as *monological*, and the participation metaphor as *dialogical* processes of learning. However, the division between acquisition and participation metaphors is seen as fundamental, and neither of them is sufficient for describing the creation or advancement of knowledge. The acquisition approach is argued to be grounded on pre-given structures of knowledge, and the participation approach focuses on mastering the cultural practices and knowledge of the community without an intentional effort for transformation. (Paavola & Hakkarainen, 2005)

More recent studies by Paavola and Hakkarainen (2004; 2005) introduce a third metaphor for conceptualizing learning: the process of *knowledge creation* referring to object-mediated collective processes where the shared objects of activity are collaboratively developed. The creation of novel knowledge is built in the interaction around and through shared objects (Paavola, Lipponen & Hakkarainen, 2004). The shared objects of knowledge-creation are collaboratively developed conceptual artefacts (e.g. ideas, plans, and designs), concrete material products (e.g. prototypes, design artefacts) or practices (e.g. standard procedures in certain work task) (Hakkarainen & Paavola, 2007). The knowledge creation metaphor is also labelled as *trialogical* learning (Paavola & Hakkarainen, 2005).

The attributes monological, dialogical and triallogical are used in this paper for analysing the service co-development interventions' effects on service development in the case organizations.

### Synthesis: Service Co-Development Effects Framework

The elements of the service co-development intervention and the following current service co-development activities in pilot organizations are simplified into a model of **six analysis attributes** that were collected from the literature of service marketing and learning science. The first three, co-creation, processes and networks, are intended to capture the knowledge that was created during the interventions, or in other words the content of the development work. The following three, monological, dialogical, and triallogical, refer to the ways the pilot organization shares existing knowledge and creates new knowledge in its everyday practices, or in other words, do their development work. The attributes, their explanations and the main literature sources are presented in Table 1.

**Table 1: The analysis attributes of service co-development interventions' effects**

Attribute	Explanation and operationalization of the attribute	Main references
Co-creation	Understanding the co-creative nature of value. Empowering variety of stakeholders and customers in the development work.	Vargo & Lusch 2004, Grönroos 2006
Processes	Figuring out the core value of the processes. Collaboration between and cross the traditional functions within an organization.	Edvardsson & Olsson 1996
Networks	Seeking new networking opportunities in order to create more value. Collaborating across the organizational borders.	Edvardsson & Olsson 1996
Monological	Bringing the knowledge from the interventions to the organizations via reports and other knowledge acquisition focused tools.	Sfard 1998, Paavola & Hakkarainen 2005
Dialogical	Sharing knowledge of development related work within the organization by interaction and practice.	Sfard 1998, Paavola & Hakkarainen 2005
Triallogical	Co-creating new knowledge within the organization by activities around shared objects and artefacts.	Paavola & Hakkarainen 2005

## METHODOLOGY AND DATA

This paper reports a qualitative multiple case study consisting of three cases in which researcher-facilitated service co-development interventions were carried out. The case data comprises semi-structured thematic interviews with eleven representatives of organizations that actively participated in the service co-development interventions. Data was collected from one group interview with three people and eight individual interviews. The interviews were supported by *boundary objects* linked with the intervention, i.e. printed photos and visualizations from the co-development gatherings collected during the intervention projects. The transcribed interviews were then analysed with qualitative content analysis method, and the categories used in the analysis (see Table 1) were formed on the basis of theory.

**Case A:** Developing further an existing public school network's educational services collaboratively with several stakeholders. The aim of co-development was to create and launch regionally coherent comprehensive education for the five schools' network/district in Helsinki, Finland, to promote project-based learning, and to develop spaces, places and operational models that would best support teaching, studying, and learning in the schools. In addition, the goal was to emphasize the role of environment and neighbourhood in teaching and learning, and to co-create a model of public-private collaboration for producing educational services. The case includes three process simulations utilizing, e.g., SimLab method, future recall, personas, and scenarios. These co-development workshops were participated by the case organization's and its networks representatives and researchers. Follow-up interviews were carried out with 5 representatives 4-6 years after the interventions.

**Case B:** Co-designing and co-developing a whole future school including its operational model, learning environment, and collaboration network. The future school was planned as a part of a new residential area in the city of Espoo, Finland. The co-development intervention had two goals: 1) to bring together the different branches of municipal administration, the various future users, and stakeholders in the school's network, from public, private and 3rd sector, and 2) to enable these actors to collaboratively create/develop the school's operational and pedagogical models, learning environment's architecture, and collaboration and management model for the broad network around the school. The case includes three process simulations, or co-development workshops, where e.g. the SimLab method, personas, and scenarios were utilized. Follow-up interviews took place 4-6 after the interventions.

**Case C:** Supporting the co-creation of a future innovation process, and related tools and practices within a globally operating firm. The context of co-development was a multinational manufacturing and service company's innovation process and a related information system. The goal was to collaboratively develop the process, and management principles and practices targeted to support the early ideation phases of the innovation process. The case consists of three consecutive process simulation/co-development projects participated by the case company's employees and management, and researchers. We follow-up interviewed three representatives from the case company 1,5 years after the last workshop.

## FINDINGS

Based on the data analysis we argue that the co-development methods and interventions have produced long-term impacts for both (i) service production and (ii) service co-development practices of the case organizations. In addition to the more tangible effects, the findings indicate that the interventions have also affected the thinking of the organizations. Thus, the effects of interventions have been identified on two levels: the concrete level related to practice, and the abstract level related to thinking.

The effects of the service co-development interventions varied notably between the cases. In case A, in which the goal was to enhance the cross-school collaboration concentrating on the core value of learning, the effects are noticeable most broadly. The interventions affected both the ways the schools produce the service, and the ways they co-develop their services further. In case B, designing of a new school's operating model for a new residential area, the delays of the construction work has hampered the implementation of the service production ideas, and also the adoption of new ways to co-create knowledge and co-develop the service further. In case C, supporting the co-creation of an innovation process, the effects of the service co-development interventions can be seen as numerous implemented service ideas and raw material for the company's continuing process and service development.

Going deeper into the six attributes for analysing the effects (Table 1), we notice that the service co-development interventions have also affected – in addition to the concrete practices – the conceptions and thinking of the participating actors. All the interviewees seem to have understood of the **co-creative** nature of value and the importance of empowering variety of stakeholders and customers in the development work. Even in case B, where the practice related effects were limited due the construction

schedules, an interviewee refers to the idea of co-creation as the main finding of the series of interventions:

“There was this one PowerPoint slide with crossing arrows that represent the dimensions [of learning], formal and informal. I’ve been using this slide and added there, which was in the [final report] book, which I said in the final seminar, which was the best finding that ‘future school is co-created’.”

As the core of the **process** thinking literature suggest, the members of the pilot organizations in case A have started to think about the core value of their operations. The work and development concentrates on important valuable issues. In case C, even though process thinking had already been strongly embedded in the organization’s everyday practices, the idea of organizing and developing activities cross the functions, from the process point of view was advanced due to the intervention sessions. Understanding the whole current big picture with players and functions in the beginning of the series of intervention sessions was crucial. The process related effects of the process visualizations and discussions in the co-development sessions of case B were perceived rather limited or controversial, though the need of visualization in such multi-stakeholder project was clearly identified. Furthermore, the interventions initiated new **network** building. In cases A and B the schools had opened collaboration with new companies that had taken part in the co-development interventions. In case B the findings and content of the intervention backed up new kind of public–private collaboration. In case A the negotiations were initiated but did not concretize into contracts.

Continuing the analysis with attributes ‘monological’, ‘dialogical’ and ‘trialogical’ produces more insights. The visual boundary objects (e.g. process models, scenario visualizations, intervention session recaps) that had been produced and used in the service co-development intervention sessions have played an important knowledge transfer role. The visualizations have acted as **monological** boundary objects, enabling the knowledge transfer from the intervention sessions to various back in the pilot organizations. The usage of some visual boundary objects had been taken further. They had been acting as platforms for further **trialogical** knowledge co-creation and service development back in the pilot organization. For example, in case A, a school merger process map from an intervention session had been the basis collaboratively building a new plan for a new school merger. In case C, most of the intervention session findings were transformed trialogically into the ‘own language of the organization’. Case A was the only case with **dialogical** effects that are related to participation in social practices. The interviewees were saying

that thanks to the intervention project the organization has started to use their own personnel as trainers especially in the ICT related matters. In addition, the teachers have started to share their good teaching practices by inviting other teachers on their classes.

The effects are visualized in Figure 1. The attributes (see Table 1) are brought in a single visualization and operationalized on a **qualitative based** three-tier scale. The black bars present the priorities of the service co-development intervention sessions on all the attributes, orange bars the effects on the practice level and red bars the effects on the thinking level.

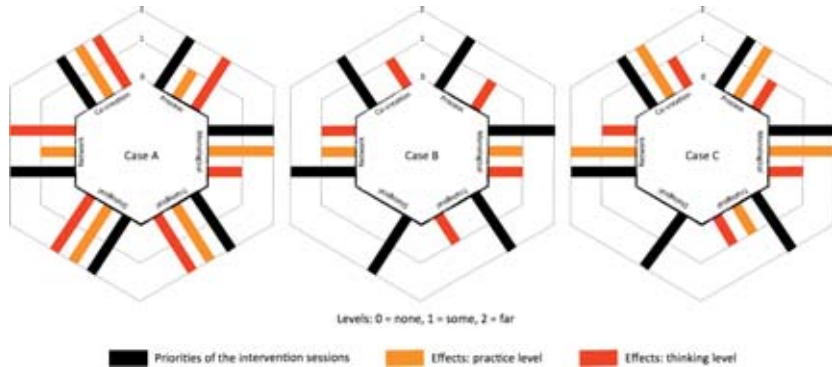


Figure 1: The effects of the service co-development interventions in three cases

## CONCLUSIONS

This study contributes to the body of knowledge of service development. Combining the theories of networked service development and knowledge-creation into one model opens a new perspective for analysing the service co-development capabilities of organizations. The finding that the effects can be seen on two levels: thinking and practice, increases the value of service co-development interventions that have not reached the practice level yet.

Furthermore, our study has practical implications to both researchers and practitioners working on co-development interventions. The categorization model helps to design interventions that take more desired effects into account. One important aspect in designing the service co-development interventions is to concentrate effort in planning the form and usage of the visual boundary objects (e.g. process models, scenario visualizations, intervention session recaps). The designer of the intervention should think whether the objects should transfer the knowledge monologically to wider audience or should they act as a platform for further dialogical knowledge co-creation and service development back in the pilot organization. However, further research is required to elaborate the suggested analysis

attributes (Table 1) with different kinds of service co-development intervention cases. Additional research between the presented cases would also be valuable for finding the factors that affect the intervention effects.

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# Workers' tacit knowledge transferred to conceptual design: the case of mobile work machine

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**Abstract:** *For decades there have been trials for making co-creation between designers and users. That has been done both in the fields of physical products and of information systems. We utilize them both as well as present possibilities for virtual prototyping. One problem in users' participation in the design process is users' difficulties to verbally describe their work know-how, as it is tacit knowledge. Our aim is to make that workers' tacit knowledge visible to designers so that it can be including in the design process. For implementing our idea, we created a virtual prototype of mobile work machine in a cave-like walk-in virtual environment. Furthermore, we organized a user test in which machine drivers operated the virtual machine and machine designers watched the drivers. The results are promising: drivers found operating the virtual machine quite similar to operating a physical machine, in addition, the designers got new information how the drivers actually act with the machine.*

**Keywords:** *User participation, Machine design, Virtual Environment, Virtual prototype*

## 1 INTRODUCTION

This paper focuses on how workers' tacit knowledge can be transferred to the early phases of product design process. Tacit knowledge is something that a person can do but cannot express without great difficulty, such as cycling, for example (Polanyi 1967).

In our study, this question is examined by using the case of a mobile work machine and its cabin. In such a case workers are machine drivers, who are low-educated people. They do not have academic education and concepts which can be used to describe the driving tasks. Instead, they are highly skilled in the practical handling of the machine in different circumstances, which is tacit knowledge.



As the drivers cannot describe their knowledge, not even the requirements for the future cabin, it is hard to get their practical knowledge into the machine design process. New tools are needed to enable designers and workers to discuss future use of products under design. Traditionally full-size physical prototypes have been used. The downside of using them is that they leave little room for later modifications, as they cannot be made in the early phase of the design process.

Instead, virtual prototypes (VP) offer a new platform for discussing prospective use and possible improvements. VPs include using of computers to visualize the prototype, but there is variation how realistic the visual image is. Besides of visual image VP might also include some functions of the product. Furthermore, VPs can be presented in different forms, such as on a PC screen or in a walk-in virtual environment (VE).

The using of VPs gives two promising notions. The first one is that they can be used in the early phases of the design process. This is needed as in those phases the general features of the machine are fixed. If the workers knowledge is aimed to make principal changes to the machine, they need to participate in an early phase, i.e. conceptual design. With VPs that is possible, as alternative versions of prototyped machine can be created easily and quickly on a useful basis.

The second promising notion is the possibility for emancipation to workers' role in the design process. Often the whole design process happens in designers' sphere, which means that designers' thought-models and language are used (Steen 2011). This does not support the aim of co-creating products by different but equal participants. Instead, if workers can participate in product co-creation by staying in their own expertise sphere, it strengthens their role and values workers' expertise higher. These kinds of solutions are implanted in Scandinavian approach to information systems development (e.g., Ehn 1988, Bjerknes & Bratteteig 1995). We use it as a basis for our solution of product co-creation.

In our study, we developed and implemented a tool for simulation of work tasks with a mobile work machine. In our case, the simulation runs on a PC-based Cave-like VE with 3D visualization and motion platform. Furthermore, the tool includes some functions of the product. With it the machine drivers can evaluate the VP by trying to operate the machine. We also organized a user test, in which machine drivers operated the VP in real work tasks. Their experiences were asked and success in the tasks was analyzed. Furthermore, some designers observed drivers' operating the VP.

In this paper, we first describe the theoretical base of our study. That includes users’ participation in product design and information systems development, as well as the use of VE and VP in design. Second, we outline our VE tool and the test uses. Third, the results, from drivers and designers’ point-of-view, are presented. Finally, there is a short conclusion.

## 2 THEORETICAL BACKGROUND

We utilize two theoretical backgrounds. The first one outlines the alternative ways how users participate in the design process. This includes both product design (section 2.1) and information system development (section 2.2). The second one focuses on the use of information technology, especially VE and VP, in product design (section 2.3). Finally, we outline the objective of our study (section 2.4).

### 2.1 Product users’ participation in design

User participation in the design process has a long tradition, but there is some disagreement about the exact extent of user involvement needed in the design work. On one hand, users are considered as informants who can supply facts about work procedures but who have hardly any design knowledge and, therefore, should have little to say about particular design issues (Olsson 2004). Users stay in their own competence area, and designers’ task is to understand them and collect information for the design process (Steen 2011). Here this approach is labeled *Designers’ move towards users* (Table 1).

Co-operation focuses on...	Designers' move towards users	Users' move towards designers
Concern for <i>what could be</i>	Co-Creation	Co-design
	Contextual design	Lead user approach
Concern for <i>what is</i>	Ethnography	Participatory design

Table 1. Different human-centred design approaches, with different starting points and emphases (based on Steen 2011).

On the other hand, there may be user representatives who participate for years in design projects and learn the design practice. In that case, there is a risk that users become professional design experts and neglect the maintenance of their work expertise (Olsson 2004). Thus, users are expected to participate in the design process and know how designers think and work. Here this approach is labeled *Users’ move towards designers* (Table 1). Besides of dividing the human-centred approaches to actor’s

roles (whose work is focused and who is asked to be flexible), they can be divided by their focus on either presenting the present situation (*what is*) or future situation (*what could be*) (Steen 2011).

Some human-centred design approaches focus on users moving towards designers. *Participatory design* aims to give future users of a computer system a role in its design, evaluation and implementation. *Lead user approach* is based on the observation that many ideas for new products originate in minds of innovative users and do not always come from professional designers. The lead user approach is typically oriented towards commercial and business concerns, whereas participatory design is typically oriented towards concerns for democracy and emancipation (Steen 2011). *Co-design* can be understood as an attempt to facilitate users, researchers and designers in creative cooperation, so that they can jointly explore and envision ideas, make and discuss sketches, and tinker with prototypes. In co-design one can invite people who have never met before and start with an idea for a novel technology or a putative opportunity (*what could be*) (Steen 2011).

Some other design approaches focus on opposite perspective; designers moving towards product users. Also these types of approaches can have different aims based on their focus on the present situation (*what is*) and future possibilities (*what could be*). *Ethnography* focuses on the present situation by looking at naturally occurring situations from workers' point-of-view (Simonsen & Kensing 1997, Steen 2011). Instead, *contextual design* and *co-creation* focus towards future products. Contextual design is intended to help researchers and designers to observe people in a (work) context, to discuss their observations in a multi-disciplinary product development team setting, and to translate these observations into specifications for a new product or service (Steen 2011). Co-creation (originally, Emphatic design in Steen 2011) provides designers access to users' experience of their material surroundings and the people in it. The term co-creation is based on the idea that consumers are active players who are co-creators of value and co-developers of their own personalized experiences (Prahalad & Ramaswamy 2000).

## **2.2 Scandinavian approach to information systems development**

Scandinavian approach to information systems development is participatory design (PD), which is about design and about participation in design by people who are potential users' of the result of the design activities (Kyng 2010). PD, created in the 1980s, was originally strongly connected to work democracy and with supporting in pursuing workers'

own goals and interests (Ehn 1988, Bjercknes & Bratteteig 1995, Kyng 2010). Nowadays PD focuses on user involvement and designing better information systems for all, as presented in Table 2 (the row Ideals; Kyng 2010).

In the early days of PD, the information system users were commonly thought to be the organization and the system developing was discussed with its managers and owners. PD differs from that by seeing workers as users, as they do their work tasks with the information system (Kyng 2010). This model worked in the 1980s, when each information system was developed for one assigned organization. Current situation differs from that, as more and more information systems are ready-made packaged products and ICT is commonly used outside of workplaces. Nevertheless, the central techniques in PD have been and still are prototyping and ethnographical fieldwork (Greenbaum & Kyng 1991, Kyng 2010).

Our study focuses on designing better machines for drivers. The aim is to incorporate drivers' work knowledge into the design process. As in PD this is done with experimental prototyping and fieldwork, we follow this tradition. However, our study has some unique features: we focus on the design of physical products and we use VPs. The most important features of PD for our study are summarized in Table 2.

Element	Early PD	Recent PD	Our study
<i>Ideals</i>	Workplace democracy; Supporting user interest	User involvement; Better systems of all	Better machines for machine operators
<i>Users</i>	Workers as opposed to managers and owners	Non-wage earners, e.g. patients, customers	Workers (machine drivers) as opposed to designers
<i>Settings</i>	Workplaces	Non-workplaces, e.g. homes	Work context, virtual environment
<i>Techniques</i>	Experimental prototyping; amateur fieldwork	Experimental prototyping; professional fieldwork	Virtual prototyping with workers' daily tasks

Table 2. Features of participatory design (PD) (partly based on Kyng 2010, p. 52).

### 2.3 Virtual prototypes in design

Prototypes are generally used in the product design process. They are used as a tool in designers' work as well as for co-operation between product users and designers. Product prototyping is divided roughly into two main types based on their realism: *low-fidelity* (lo-fi) and *high-fidelity* (hi-fi) prototyping (Yang 2005).

Lo-fi prototyping is characterized by a quick and easy translation of high-level design concepts into tangible and testable artifacts. Lo-fi is also known as low-tech, as the means required for its implementation consist, most of the time, of a mixture of paper, cardboard, post-it notes, acetone sheets, etc. A clear advantage of lo-fi prototyping is its low cost and the fact that also non-professionals can actively participate in the idea-crystallization process. (Egger 2000).

At the other extreme, a hi-fi prototype is often created with the same methods as the final product, and hence it has the same appearance as the final product (Walker et al. 2002, Yang 2005). Hi-fi prototyping incurs higher costs, as it takes a longer time and more money to produce (Egger 2000). Although lo-fi and hi-fi prototypes can be seen as the opposite ends in prototyping, they both can be used in the same design process. In user-centered product design, paper sketching is used in the beginning of the design process and later replaced by digital prototypes (Stapper et al. 2009).

Some studies focus on virtual prototypes, which are computer-created models and simulations. Kim et al. (2011) compared consumers' understanding of virtual prototypes presented in an immersive virtual environment (VE) and in the Internet via a computer screen; no statistical differences in customer impressions. In their study, the design task focused on details of car interior, such as the controlling panel (Kim et al. 2011) which does not give rise to the feeling of being somewhere else, described as the concept of presence in VE studies (Steuer 1992, Suh & Lee 2005). A disparate VP study was made by Koutsabasis et al. (2012), who focused on co-operative design in virtual worlds with avatars. Their result suggests that virtual worlds can effectively support conceptual design activities (Koutsabasis et al. 2012).

## **2.4 The objective of our study**

We utilize the above approaches for our study. Our goal is the same as in the early PD: to strengthen workers' role, respect their knowledge and support their possibilities to work effectively. Earlier information systems development methods did not give space for workers' knowledge and PD was established to solve that problem by developing and bringing new development methods. We needed to do the same, as machine design team lacks the knowledge of work practices.

The machine design tradition uses a professional driver in the design process. However, by becoming a permanent part of the design team the driver gradually loses the connection to driving work practices and

becomes a design professional. Other possible methods include ethnographical fieldwork to see how machine driver work. Only inside of a cabin it can be seen what the driver does, however, there is no space for extra person in a cabin. In such a case, videotaping is one option, but it does not work in a mine case as it is too dark there. All above problems can be overcome by using VPs in a VE and letting machine drivers do their work tasks there so that other design team members can see what they are actually doing. That is what is done in our study.

### **3 METHODOLOGY AND DATA**

We created a co-creation tool, which supports the co-creation approach by showing how workers work with the tool that is under design. The tool is VIP2M in a walk-in VE. Making drivers' work visible to designers gives an illustrative starting point to drivers' and designers' mutual discussions. Our solution differs from the earlier ones by focusing on how drivers' will work with the machine that is under development; in our case the machine is simulated in VIP2M. Furthermore, one benefit of using VIP2M is that the machine prototype can be changed quickly and several alternatives can be tried, which also supports creativity and mutual understanding.

Walk-in VEs, such as cave-like environments, are enabling technology for co-creation. Influenced by interactivity and media richness, virtual worlds can increase telepresence or, shortly, *presence* (e.g., Steuer 1992). Presence is often defined as a subjective experience of being in one place while physically situated in another (Suh and Lee 2005). When a subject gets immersed in a VE, the medium providing the virtual world disappears from the conscious attention of the subject. This creates a perceptual illusion of non-mediation, i.e. presence. Presence can also be seen as resulting from interaction between a person and the environment. In our case, interaction with the synthetic world offers the subject a feeling of immersion, and the world of the computer becomes the world of the user (Coelho et al. 2006). In walk-in VEs, the sense of presence for the users is generated with different methods of sensory feedback known as the immersive components of VEs. A basic immersion component is a stereoscopic three-dimensional (3D) view. Besides of 3D view, also sounds and different haptic and tactile displays are common immersion components.

For our study, VIP2M was simulating a heavy loader used in underground mines (Figure 1). Its design process benefited from the practical work knowledge of drivers and mechanics. VIP2M is useful for making work visible, although, to the driver of the simulated machine, it only feels like a

real machine in an authentic environment. This can be measured by evaluating the feeling of presence generated for the user driving VIP2M.

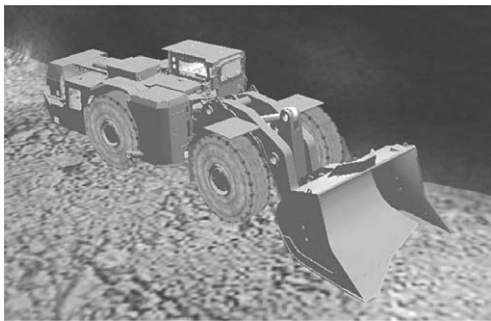


Figure 1. An outside view of the loader which was prototyped in VIP2M

The technical environment which we used in the implementation of VIP2M is a walk-in VE (Figure 3). It consists of a three-wall rear-projection based system. It takes advantage of active stereo projection and optical head tracking, which is implemented with markers on the shutter glasses and 6 cameras. The audio environment comprises a 5.1 sound system. An essential part of VIP2M is the pneumatic motion platform with six degrees of freedom.

In the real loader the cabin is tiny. The drivers sit sideways facing to the right side of the machine and they must turn their heads left when driving forward and right when driving on reverse. The VE's three walls are straight-angled, which makes it quite immersive. The awkwardness of the driving position is increased by the very limited view outside from the cabin (Figure 2). Especially the view forward is very constrained due to the large bucket, which blocks the line of sight almost completely in certain positions. Due to these kinds of factors, it is extremely important to have the eventual user of the machine take part in the design process.



Figure 2. The view from the loader through VIP2M.



Figure 3. Technological solutions of our VE.

To make VIP2M more realistic, there are some physical parts from the real cabin. The driver chair is similar to the chairs used in mining machines. Also the control joysticks correspond to the actual controls of a loader. With the left joystick, the driver selects the driving direction and current gear as well as controls the orientation of the body of the machine. The right joystick is used for controlling the boom and the bucket. Most of the controls of the actual machine are present in VIP2M. However, the gas and brake pedals are electric, whereas in a real machine the brake is hydraulic. The control panel of the machine is a virtual one. It contains a display, which provides the driver with information about the state of the machine (e.g. driving direction, current gear, and revolutions per minute, RPM).

For evaluating the implemented VIP2M, we conducted user tests with six professionals, whose everyday work included designing or testing mining machines. Before the test, the users filled a questionnaire about their daily work, their experience on driving mining machines, and what driving a real machine in a mine feels like. The task of the test was to drive into a pile of rocks, fill the bucket with rocks, drive a few hundred meters to the unloading zone, and empty the bucket there. All user tests were recorded with two video cameras so that the user actions could be investigated. After the VIP2M tests, the users completed another questionnaire, this time about VIP2M and the virtual interface. Finally, group discussions were conducted, where each test user had the possibility to discuss the experience with other test users and give final comments about the system. The whole process lasted 3–4 hours for each user.

## 4 FINDINGS

The findings of our user test are presented from two perspectives. First, drivers' perspective focuses on how realistic they found driving the virtual



machine. Second, designers' perspective focuses on their experience on watching drivers' actions with the virtual machine.

#### **4.1 From drivers' point-of-view**

In evaluating the VE driving experience, the drivers compared VIP2M to a real machine. They found the immersive VE very useful although there were some limitations.

The drivers mentioned several features in which the virtual machine was sufficiently similar to a real machine. The visibility from the cabin was limited realistically. Observation of the environment is hard in real life, and VIP2M was quite realistic in that regard. For example, the use of head tracking allowed the driver to peek outside through the windows as in real life. The other realistic feature was the motion platform, which allows the users to really immerse themselves in the simulation. This makes the test situation correspond better to actual driving. A concrete example is that the motion platform forces the test user to drive slowly in places where the corridor is bumpy.

The users were asked about the biggest differences between driving the VIP2M and a real machine. All of them mentioned that the movement generated by the motion platform was too smooth in certain places. The second major point requiring improvement concerned lighting and the visual appearance of the mine. The lights of the simulated loader were not bright enough, making the view even darker than in a real mine. The contrast between lighted and dark areas was too small, making the turns of the corridor hard to perceive. Finally, the sounds of the machine were generally rated as too faint.

Although VIP2M includes limitations, drivers' experience was in general positive. With it the drivers performed the driving task as they would do it with a real machine.

#### **4.2 From designers' point-of-view**

The designers were watching the driving test in another room. They watched it together from a computer screen. This was a new experience to the designers, as in real mine situation, it is too dark and narrow that designers could watch drivers' operation. The designers had only got verbal information from the test drivers about the new features of a machine.

In the VE test situation the designers saw how the drivers act with the machine in practical tasks. By watching the actions they got new information. In some cases, they were surprised by how the drivers acted

with the machine. One such example was how the drivers turned the machine to another direction. The virtual tunnel included a special turning loop as the test mine had a similar one. The drivers did not need it, as they turned the machine in the driving road – for doing that the machine needs to turn to its extreme positions several times.

## **5 FUTURE STUDIES**

The results of our test use are promising for getting workers' tacit knowledge to design process. However, the used research setting did not reach sufficient information which described designers' interpretations. One problem for research purposes is that the designers – who were Finnish engineers – hardly talk. They are not used to verbally describing their feelings, uncertain knowledge and lack of their understandings. They just watched the driving, said disconnected words and nodded their heads.

Future studies are needed for analyzing how workers' tacit knowledge is understood by designers and how it can be taken into the design process. It can be studied by a combination of test uses with VIP2M, designers' co-operative design tasks and individual interviews. Research data need to be gathered with videotaping.

## **6 CONCLUSIONS**

Our aim was to give a new solution how workers can participate in product design process by staying in their own expertise sphere. As relevant part of workers' knowledge is tacit, it requires that workers can show how they work. This can be done with virtual prototypes.

We studied the idea with one case, a mobile work machine and its cabin. We created a VE tool, VIP2M, and organized a user test in which drivers operated the virtual machine and designers watched the test driving. The virtual machine was good enough so that the test drivers found driving it close to driving a real physical machine. In the test situation designers got new information about drivers' actions.

Future studies are needed for reaching understanding what new information designers can get from such a virtual test and how it can be linked to machine design process.

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The first CO-CREATE conference in 2013 is convened by SimLab, a research and teaching unit at the Department of Industrial Engineering and Management, Aalto School of Science. Researchers of collaborative innovation, co-design and knowledge co-creation are invited to a first international trans-disciplinary dialogue on the human-centric co-design of innovation in networks. The CO-CREATE 2013 is also the culmination of SimLab's FiDiPro project Corinna.

The CO-CREATE 2013 conference addresses the questions: Who is the "CO" in co-design? How can collaborative co-design processes be triggered, achieved and managed for innovation? What are the limits of engagement and openness for innovative processes?

The conference themes are: Theoretical foundations of Collaborative Innovation Processes, The Management and Organization of "CO", Paradoxes in Collaborative and Open Innovation in Networks, and Spaces, Methods and Tools for Co-Design and Co-Creation.



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